# THEORY OF HINDI SYNTAX

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# THEORY OF HINDI SYNTAX

## DESCRIPTIVE, GENERATIVE, TRANSFORMATIONAL

*by*

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OF THE CZECHOSLOVAK ACADEMY OF SCIENCES

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Scientiae enim per additamenta fiunt, non enim est possibile eundem incipere et finire.

Guy de Chauliac

# PREFACE

Thanks to Nature, prefaces are written, as usual, in a more personal tone, so that I may vent my delight derived from the circumstances under which this monograph came into being. Really, I cannot complain about a dully uniformity of my destiny: all this, however, is not fortuitous — on the contrary, it is conditioned historically, dialectically, it is, so to say, inevitable, inescapable (does not it smell of fatalism?).

After my return from Poona where I spent three months in busy studies at the Deccan College, I came to the conviction that for a poor student without any influence it is impossible to obtain a flat in Prague (who of us can give his five-year salary for it?) and I moved with my little family from our single room used until then to the temporarily vacant flat of my mother in Carlsbad. And this booklet is a product (or, by-product?) of three picturesque months of loafing in the spa of Carlsbad where I lolled about having got rid of the chaos, smog and pigsty of our beloved capital.

I must admit, it was not so easy to stay in Carlsbad because the central heating in the house we live was not working, and for some weeks I had to go daily to a near wood and bring on my shoulders so many stolen logs and sticks for out hearth — and you cannot imagine what a quantity of logs and sticks such a damned hearth wants.

Undoubtedly, to scent the sensations of a surreptitious woodcutter was very beneficial for both my feeble body and my preposterous thinking, but still I cannot help feeling that my nomadic way of life without a flat and without any possibility to take out my books, journals and card-indexes from cartons of margarine, although so far from resembling the way of life of philistines, can be endured for three or five years, it is true, but it cannot be endured for ten years or even more. (For, I must confess, I do not already believe in the stimulative power of mere ideas.) Obviously, my research work makes for nothing (I mean nothing from the orthodox materialistic viewpoint) and it made me think that I should try and find another job (in our society, the best job I know is to work in a little pub as the publican, but, unfortunately, I do not have the necessary qualification for such a responsible post).

However, *tout est enchaîné pour le mieux* and even the cold weeks of April and beginning May went away and the woods of Carlsbad have been saved from my plundering raids. Then, it was so agreeable to take walks out of the town with my

wife and son, to behave foolishly having forgotten all the troubles of our workaday world, to broil hot dogs on a little fire and, after such a feast, to go and have some pints of Pilsner at the open-air restaurant of Little Versailles!

And all the time, during both the cold spring days and the nice and warm early summer, whims, notions and ideas connected with my conception of the syntactic structure of Hindi were over my head, they originated, conflicted with each other, some of them yielded and expired, and, finally, the victorious ones crystalized and took on their definitive looks. Naturally, many of my thoughts have been hatched before, mostly as a consequence of my recent busy studies in Poona. (However, I am not personally responsible for everything — de Chauliac is my witness!) Methodologically, of course, I owe a great debt of gratitude to the treatises on laziness by Sir Bertrand Russell, Monsieur Paul Lafargue and Signore Gianni Toti.

But none of that now! Let me speak more seriously, please.

My theory of Hindi syntax is based on only two primitive terms, namely the tagmemic function and the tagmemic functor, and, more, the operation of interconcatenation. All syntactic units are derived from these three basic concepts. I tried to put forward my theory as concisely as possible having in view that time (even the time of students) is money. At the same time I hope that the approach to the syntactic system of Hindi as explained here is much more applicable than any other, although it is comparatively so simple.

My gratitude is due to the Oriental Institute of the Czechoslovak Academy of Sciences (Prague) for the graciousness with which I have been allowed to work outside Prague, to the Deccan College (Poona) for the hospitality I took advantage of from December 1966 until February 1967, and to the Czech Literary Fund (Prague) for defraying my travel expenses to India and back.

I render sincere thanks also to all who helped me with valuable books otherwise unattainable, namely to K. C. Bahl (Chicago), A. S. Barkhudarov (Moscow), Y. Kachru (Urbana), A. Kessler (New York), S. Lienhard (Stockholm), A. G. Mãgrūḷkar (Puṇe) and P. de Ridder ('s-Gravenhage).

Carlsbad, July 6, 1967 Vladimír Miltner

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# I. INTRODUCTION

# 1. PRELIMINARIES

Any system is determined by its constituent elements and the network of relationships among them. Each element of a system is related to at least one other, or at least one other element is related to it — there can be no isolated element in a system. (I would like to remind here that it is very difficult, nay impossible, to grasp the elementary facts or phenomena as such; and it is why modern sciences are being directed rather to processes and relationships.)

As a matter of fact, nothing can be entirely individual — if it were so, then the objective reality would split into a complex of isolated phenomena without any relationships, and, consequently, without any laws. All objects, however, are mutually related, and, thus, implicitly determined. We should only reveal these relationships.

All the phenomena of the objective reality exist in mutual identities and differences and are arranged in a hierarchy of relationships, or, in other words, they form dialectic systems. A system may represent a subsystem or even an element of a hierarchically higher system and an element can be looked upon as a system of hierarchically lower elements. If we accept and apply this approach to a phenomenon, the process of our cognition gets on always deeper into the phenomenon, always nearer to its substance — let us recall the the Lenin's endless spiral as a symbol of cognition. Some steps or items may show only hypothetical effects which should be either discovered or proved impossible, of course.

This leads us to mention abstractions. Generally, the abstractions enable the students to recognize the objective reality better and better: the more profound is the knowledge, the more abstract is its formulation, and vice versa. On the other hand, however, if the abstractions are exaggerated too much, the analyzed phenomena dwindle away into a sciolistic fog (and I would like to avoid this). Hence it follows that before we go on, we should come to an agreement on the degrees of abstractions, otherwise our mutual understanding would be very difficult: as to me, frankly spoken, I like to apply the highest possible degrees of such adequate abstractions which are in harmony with the degree of my knowledge.

In this connection, it is suitable to accept the conception of tokens and types (Herdan) and thus consider explicitly the important distinction between the sign

occurrence and sign design (Bach). Simply, a type is a set of tokens whose structural distribution is the same.

If we observe in a text that, for example, some adjectives expand (or, modify) some substantives (whatever their tagmemic functions may be), one may expect that all adjectives (and all their forms) can do it. But in such a case the observed phenomenon has been overgeneralized, we have abstracted too much as far as the actual living language is concerned — all of us know very well that all substantives cannot be expanded (or, modified) by all adjectives without exceptions.

Firstly, the power of semantics encroaches even upon this sphere, and, secondly, we should consider the morphologic limitations of congruency. Thirdly, moreover, in actual sentences, any expanding (or, modifying) tagmeme can depend on one head tagmeme only, a consequence of the laws of sentence structure. *Mutatis mutandis*, this holds good for other pairs of tagmemes, too, and the general principle of "every one with each other" is not applicable here.

However, when working on the grammar proper without touching the things semantic, I prefer to recognize only the grammatic limitations, so that colourless green ideas may sleep furiously (Chomsky) without any objection from my part, unless they infringe grammatic rules. (After all, let us allow the modern poetry to develop as freely as possible.)

Then, any type is a variable, a symbol together with a set of tokens, and it is understood that the type stands for any token of the set. The set is the range of the type and each token of the set is a value of the type.

The neglect or the failure to differentiate carefully between tokens and types leads very easily to error and obscurity. And we should not forget that a token can be interpreted as the type of a hierarchically lower set of tokens and a type can be held for one of the tokens of a hierarchically higher type.

Now, I should remind you shortly of some basic concepts of the theory of sets and the theory of graphs, and, partially, also of the theory of quantification.

The notion of set has no definition, but intuitively we may say that it is simply a collection into a whole, of definite well distinguished objects or individual entities referred to as elements (Cantor). An element is a member of a set if it is one of the elements whose collection constitutes the set; if not, it is not. There exist only these two possibilities: an element either belongs to a set or it does not belong to it.

A set can be defined by the list of its elements; for example, if a set consists of the elements $a$, $b$ and $c$, it is represented as:

$$S = \{a, b, c\}.$$

The order in which the elements of a set are written is substantially irrelevant.

Set membership may be indicated in symbols as follows:

$$a \in S$$

which reads "the element $a$ is a member of the set $S$", or "the element $a$ belongs to the

set $S$". If an element is not a member of a set, i.e., if it does not belong to it, we write:

$$d \notin S$$

which reads "the element $d$ is not a member of the set $S$", or "the element $d$ does not belong to the set $S$".

Sometimes, it is necessary to consider subsets of a set; then, we have to decompose the set into subsets. A decomposition of a set $S$ is a collection of disjoint subsets of $S$ whose union is $S$. (The idea of subsets, and, generally, of sets, has nothing to do with the geometric idea of continuity.) If, for example, a set $S$ whose elements are $a$, $b$, $c$, $d$, $e$, $f$ and $g$ is decomposed into three subsets $\{a, c, f\}$, $\{b, e, g\}$ and $\{d\}$, we write:

$$S = \{\{a, c, f\}, \{b, e, g\}, \{d\}\}.$$

When we have to work with the relative complement of a subset $A$ with respect to a set $S$, we can symbolize it simply as $\bar{A}$ which means:

$$\bar{A} = \{x \in S;\ x \notin A\},$$

or, in words, "$\bar{A}$ is the set of elements belonging to all subsets of the set $S$ except the subset $A$".

As to the set operations, we need only that of interconcatenation (Cooper): if $A$ and $B$ are sets of elements, then $A \cdot B$ is the set of all pairs $(a, b)$ such that $a \in A$ and $b \in B$ which can be formed by concatenating every member of $B$ to every member of $A$. The order is relevant here, we speak of ordered pairs; and we must never confuse ordered pairs with a set of two elements because of the relevancy of the order of elements in the ordered pairs.

The result of the interconcatenation of two (or, often, more) sets to produce a new set of composite elements is interpreted as the Cartesian product of sets. In other words, the members of the interconcatenated sets may be considered as coordinates for the composite elements of the resulting set. It is useful to imagine Cartesian products in terms of such a geometric representation especially in cases when the elements of the coordinate space are more abstract.

The interconcatenation is an operation which can be defined over a family of sets instead of simply over two sets. Then, the Cartesian product of the $A_i$ is the set of sequences $(a_i)$ where $i = 1, 2, \ldots, n$, such that $a_i \in A_i$ for every $i$; it is written:

$$\prod_{i} A_i$$

The elements of a set may be represented graphically by points in the plane and the related elements may be joined by a continuous lines with arrowheads pointing from the hierarchically higher elements (predecessors) to the hierarchically lower ones (successors). An element of the set is called a vertex of the graph (or, more precisely, for our purposes, of the arborescence) and the arrowheaded lines between related elements are called arcs.

For an arc $u = (a, b)$, the vertex $a$ is its initial vertex (or, predecessor), and $b$ its terminal vertex (or, successor).

The outward demi-degree of a vertex is defined to be the number of arcs having the vertex as initial; the inward demi-degree of a vertex is the number of arcs having the vertex as terminal. The vertex with the inward demi-degree equal to zero is called a root, or, in others words, the root is such a vertex of the arborescence which is not terminal for any arc.

A path is a sequence of arcs such that the terminal vertex of each arc coincides with the initial vertex of the succeeding arc, if any, and the initial vertex of each arc is identic with the terminal vertex of the preceding arc, if any. The length of a path is the number of arcs in the sequence. A path is simple if the arcs used are all different and if it does not meet the same vertex more than once (this, of course, is irrelevant for arborescences).

A circuit is a finite path which begins at a vertex and terminates at the same vertex.

In syntax, however, we are concerned with a special kind of graphs, namely the arborescences.

A graph is an arborescence with root $r$ if it consists of at least two vertices connected by an arc, if every vertex except $r$ is the terminal vertex of a single arc (which implies that $r$ is not the terminal vertex of any arc), and if there are no circuits in the graph.

It is easy to visualize an arborescence: it is a graph in which every arc has a unique orientation; there is only one initial vertex with its inward demi-degree equal to zero and an unlimited outward demi-degree, and an unlimited number of terminal vertices with their inward demi-degrees equal to one and outward demi-degrees equal to zero. Further, there is a simple path between the root and every other vertex (Berge).

Finally, I introduce two quantifiers, namely universal and existential, symbolized as $(\forall x)$ and $(\exists x)$ which means respectively "every individual $x$ is such that" and "some individual $x$ is such that" (Faris).

And this is quite sufficient to understand the following exposition. I would like to add here only a remark more: we undoubtedly agree that adequate classification of elements must be exhaustive and exclusive in the sense that each element of the set under question is assignable to one or other class or subset and all elements assigned to a class or subset share a characteristic attribute which pertains to no element assigned to any other class or subset; on the other hand, however, we should keep in consideration that there are different degrees of abstractions and generalizations and turn this fact to advantage during the process of our investigation.

# II. UNITS

## 2. TAGMEMES

DEFINITION: The set of tagmemes is the Cartesian (or, combinatorial, Kamke) product resulting from the interconcatenation (Cooper) of the set of tagmemic functions and the set of tagmemic functors, that is, any tagmeme $= F \cdot f$.

Any actual tagmeme represents the dialectic unity of its content and form, i.e., of its tagmemic function $F$ and tagmemic functor $f$.

Tagmemic function is the syntactic role a functor plays in the syntactic structure of a concrete sentence. Tagmemic functor is such a part of speech or a morphologic cluster of some parts of speech, or even a clause which expresses (or, realizes) a tagmemic function in the syntactic structure of a concrete sentence.

These two aspects of tagmemes are inseparable from one another, they cannot really exist alone. Any tagmemic function must be performed by a functor, and no tagmemic functor can exist in a sentence without implying a function. It is only owing to the power of our abstract thinking that we can speak of them separately.

In my previous studies, I used the term of sentence part instead of that of tagmeme. The advantage of one-word terms, however, is obvious, and it is why I borrowed the term of tagmeme from the teaching of tagmemists (Elson-Pickett). My conception of tagmeme, in contradistinction to them, does not include grammaticals. It coincides rather with the conception of sentence part or tagmeme as such a part of sentence which can be replaced by a corresponding interrogative substitute without any change of the given sentence structure (Dāmodar).

The tagmemic functions suitable for Hindi are predicate *P*, subject *S*, object *O* and modifier *M*.

Predicate is the unique tagmemic function which a finite verb or any nominal form accompanied with a finite verbal form of a copula can realize. (It can be realized, of course, by other functors, too, but finite verbal forms cannot express other tagmemic functions.)

Subject is the function which is performed by a nominal form in the nominative or ergative case being directly dependent on the tagmeme of predicate.

Object is the function which is expressed by a nominal form in the accusative case

(and that direct or oblique) dependent directly on any form of a transitive verb or any other part of speech accompanied with any form of a transitive copula irrespective of their tagmemic function.

Modifier is any other tagmemic function which is not identic with the functions just delimitated.

Examples:

*P* is the tagmemic function of *pāva* in *tāsu soha ki kachaḍā pāva* (Roḍā), or of *hãĩ ... suta* in *hama hãĩ dašarattha mahīpati ke suta* (Kešav), or of *kiyā thā* in *tumne ise mār ḍālne kā niščay kiyā thā* (Prabhākar).

*S* is the tagmemic function of *rāja* in *naga motiya mānika navala kari salāha sāmela kari pahirāi rāja manuhāra kari gajjanavai paṭhayau su ghara* (Cand), or of *tū* in *tū rānī sasi kãcana karā* (Jāysī), or of *jo prakriyā ke niyam aur sthāyī ādeš pravṛtt the ve* in *jab tak khāḍ /1/ ke adhīn niyam nahĩ banāye jāte tab tak is sāvidhān ke prārambh se ṭhīk pahile bhārat ḍomīniyan ke vidhān-māḍal ke bāre mẽ jo prakriyā ke niyam aur sthāyī ādeš pravṛtt the ve aise rūpbhedõ aur anukūlõ ke sāth jinhẽ yathāsthiti rājy-sabhā kā sabhāpati yā lok-sabhā kā adhyakṣ kare sāsad ke sābādh mẽ prabhāvī hõge* (Sāvidhān).

*O* is the tagmemic function of *gāi* in *sukili gāi laüḍẽ hāku* (Dāmodar), or of *unhi* in *mãĩ unhi dhaurāvãũ* (Mājhan), or of *ki ḍā. anīlā ne mujhe bulāyā thā* in *mãĩ to itnā jāntā hũ ki ḍā. anīlā ne mujhe bulāyā thā* (Prabhākar).

*M* is the tagmemic function of *aisā ... jini jaga catura barana raha lāyā* in *aisā re upadesa dāṣai šrī goraṣa rāyā jini jaga catura barana raha lāyā* (Gorakhnāth), or of *anekana mẽ* in *eka anekana mẽ rahai* (Bhūṣaṇ), or of *badalkar* in *dhotī badalkar umānāth purohit ke pās vedī ke nikaṭ pahũcā* (Nāgārjun).

The tagmemic functors are classified into nine classes and some necessary subclasses like this:

*1* substantives and substantivized parts of speech which were not included into any of the other classes below;

*2* non-participial verbal tenses and imperative,
  *21* intransitive and passive,
  *22* transitive;

*3* adjectival participles,
  *31* intransitive and passive,
  *32* transitive,
    *321* not in an ergative construction,
    *322* in an ergative construction;

*4* other nominal forms of verbs,
  *41* verbal substantives (*gerundia*),
    *411* intransitive and passive,

*412* transitive,
*42* agent nouns,
*421* intransitive and passive,
*422* transitive,
*43* verbal adjectives (*gerundiva*, or, *participia necessitatis*);
*5* adjectives,
*51* adjectives proper,
*52* adjectivized functors (i.e., the so-called genitives, the functors adjectivized by *sā*, *vālā*, etc.),
*53* numerals,
*531* cardinal,
*532* ordinal and multiple,
*533* collective;
*6* adverbial form of verbs,
*61* adverbial participles,
*611* intransitive and passive,
*612* transitive,
*62* absolutives,
*621* intransitive and passive,
*622* transitive;
*7* adverbs,
*71* adverbs proper and adverbial expressions,
*72* adverbized functors (i.e., adverbized substantives, adjectives, the so-called genitives, etc.);
*8* substitutes,
*81* substantival (i.e., personal and reflexive pronouns),
*82* substantival-adjectival (i.e., demonstrative, interrogative and indefinite pronouns),
*83* adjectival,
*831* possessive pronouns,
*832* pronominal adjectives,
*833* adjectivized forms of substitutes,
*84* adverbial,
*841* demonstrative, interrogative and indefinite adverbs and adverbial expressions,
*842* adverbized forms of possessive pronouns,
*843* adverbized forms of pronominal adjectives,
*844* adverbized forms of adjectivized forms of substitutes;
*9* unanalyzed syntactic constructions which express a tagmemic function,
*91* clauses,
*92* absolute constructions,
*93* other syntactic constructions (e.g., quotations).

It is suitable, and often very useful, to consider also the functor class Ø, that is zero.

Examples:

*1* is the tagmemic functor of *suāra* in *kāṭhahũ sthālī odana suāra pāca* (Dāmodar), or of *nārāyaṇadāsa nẽ* in *taba nārāyaṇadāsa nẽ eka manuṣya cākara rākhyo* (Gokulnāth), or of *hã mẽ* in *inṭak ke netā bhī milmālikõ kī isī hã mẽ hã milāte hai* (Janyug).

*21* is the tagmemic functor of *ohaṭa* in *dharme bāḍhata pāpu ohaṭa* (Dāmodar), or of *jaihãi* in *terī sãu merī suni maiyā abahī biyāhana jaihãũ* (Sūr), or of *bhej diyā jāe* in *vah patr āj hī bhej diyā jāe* (Colloquial).

*22* is the tagmemic functor of *vakhāṇaï* in *jo jemva jānaï so temva vakhāṇaï* (Roḍā), or of *suṇāvai* in *koyala sabada suṇāvai* (Mīrā), or of *nahĩ karegā* in *aisā bāt ham nahĩ karegā* (Bāzārū).

*31* is the tagmemic functor of *caḍhyau* in *tabai sāhi gorīsa cinhāva caḍhyau* (Cand), or of *kiyo* in *mo kõ to tero kiyo bhāvata hai* (Gokulnāth), or of *so jāte* in *hāy hāy kar log sãjh ko nirāhār so jāte* (Tripāṭhī).

*321* is the tagmemic functor of *bhaṇata* in *bhaṇata goraṣanātha eka pada pūrā* (Gorakhnāth), or of *lāvatī* in *braja juvatī syāmahī ura lāvatī* (Sūr), or of *na karate* in *pāpa hama tau na karate* (Padmākar).

*322* is the tagmemic functor of *vakhāṇī* in *roḍẽ rāula-vela vakhāṇī* (Roḍā), or of *saje* in *sautina saje bhūṣana basana sarīra* (Bihārī), or of *kahā* in *mãine kahā jahal hogā ki jarimānā patā nahĩ* (Nāgārjun).

*411* is the tagmemic functor of *jāṇa* in *poṭala lai jāṇa pāra* (Dāmodar), or of *uṭhaba* in *prema magana tehi uṭhaba na bhāvā* (Tulsī), or of *rahne* in *gãv vāle gãv mẽ rahne nahĩ dẽge* (Varmā).

*412* is the tagmemic functor of *suṇaṇa kāja* in *jaṇu pūniva hi pūniva hi karā cãda koḍaĩ tahi karaü suhāvaü volu suṇaṇa kāja pheḍi uāyā nāvāthi* (Roḍā), or of *jatāvana* in *so śrīṭhākurajī gusāĩdāsa kõ sānubhāvatā jatāvana lāge* (Gokulnāth), or of *ṭāl denā* in *unhẽ keval pratīk kahkar ṭāl denā ek baṛe saty kī or se ãkh mũd lenā hogā* (Caturvedī).

*421* is the tagmemic functor of *soaṇihāra* in *soaṇihāra jābhā* (Dāmodar), or of *sovanihārā* in *moha nisā saba sovanihārā* (Tulsī), or of *jānevālī* in *šahar jānevālī bas udhar hī hai* (Colloquial).

*422* is the tagmemic functor of *karaṇihārẽ* in *kāha karaṇihārẽ āchia* (Dāmodar), or of *dekhanihāre* in *bhae magana saba dekhanihāre* (Tulsī), or of *calānevāle* in *tīr calānevāle kar mẽ use cūṛiyã kab bhāyĩ* (Cauhān).

*43* is the tagmemic functor of *lūṭibā* in *nagara saba lūṭibā* (Gorakhnāth), or of *kībo* in *kahyo tihāroi kībo* (Tulsī), or of *karano* in *tā tẽ vaiṣṇava kõ vicārikẽ kāma karano* (Gokulnāth).

*51* is the tagmemic functor of *bholā* in *bholā loka na jānai moṣa duvāra* (Gorakhnāth), or of *nīcehã* in *ũce ṭhãva jo baiṭhai karai na nīcehã sãga* (Jāysī), or of *svāyattšāsī* in *āsām rājy kī vidhān sabhā mẽ svāyattšāsī jilõ ke liye bhī sthān rakṣit rahẽge* (Sāvidhān).

*52* is the tagmemic functor of *likhive ko* in *aura mādhavabhaṭṭa ko likhive ko baṛo abhyāsa hato* (Gokulnāth), or of *vivekānand sam* in *jākar vivekānand sam kuch sādhujan is deś se karte use kṛtkṛty hāĩ ab bhī atul updeś se* (Gupt), or of *roo mat roo mat māĩ sitambar mẽ phir āũgā vālā* in *roo mat roo mat māĩ sitambar mẽ phir āũgā vālā kissā kyā hai* (Saksenā).

*531* is the tagmemic functor of *dasa* in *dasa haththī su bihāna sāhi gorī muṣa kinnau* (Cand), or of *pãca* in *pãca kuṭũba mili jūjhana lāge* (Kabīr), or of *1862* in *au samvat 1862 mẽ nauāv gavarnar valjlī larḍ mārṭãg sāhav bahādur ke rājy mẽ is pothī ko samāpt kiyā* (Mišr).

*532* is the tagmemic functor of *tīje* in *mohī tohī bhẽṭa bhūpa dina tīje* (Tulsī), or of *dūnī* in *baraje dūnī haṭha caṛhai* (Bihārī), or of *dūsrī* in *jahã tak tithiyõ kā sambandh hai tārsaptak ke uprānt dūsrā saptak 1951 ī. kā prakāšan nayī kavitā ke itihās mẽ dūsrī mahattvpūrṇ ghaṭnā hai* (Caturvedī).

*533* is the tagmemic functor of *tīnãũ* in *tīnãũ pana māĩ bhakti na kīnhī* (Sūr), or of *āṭhãũ* in *āṭhãũ jāma hiyo rahai uṭhyo usãsa samīra* (Bihārī), or of *āṭhõ* in *aur āṭhõ paṭrāniyã āṭhõ pahar kī sevā mẽ rahāĩ* (Lāl).

*611* is the tagmemic functor of *nhāẽ* in *gãga nhāẽ dharmu ho pāpu jā* (Dāmodar), or of *jāge binu* in *jāge binu bhagati na* (Tulsī), or of *calte hī* in *māĩne apko pārvatī ke sāth calte hī dekhā cār mīnār ke pās* (Colloquial).

*612* is the tagmemic functor of *kiẽ* in *aho kāha e suāra vẽṭali kiẽ rãdha* (Dāmodar), or of *lāgata* in *sītā paga lāgata diyo āšiṣa šubha šatrughna* (Kešav), or of *socte socte* in *ek din yahī socte socte use ãdherī rāt mẽ māṇik ke pās leṭe leṭe khayāl āyā* (Bhaṭṭ).

*621* is the tagmemic functor of *dhasa dhasa* in *te dekhatahã savahã taruṇāhã apāvive karĩ khaṇusaĩ dhasa dhasa paḍahī hiā* (Roḍā), or of *caṛhi* in *caṛhi basahã bidhubhūṣana cale* (Tulsī), or of *jākar* in *tab jākar māĩ sāth ā pāyā* (Nāgārjun).

*622* is the tagmemic functor of *ũcāi* in *lagā loha ũcāi paryau ghummara ghana majjhai* (Cand), or of *dikhāyakai* in *tribalī nābhi dikhāyakai sira ḍhaki sakuca samāhi alī alī kī oṭa hvai calī bhalī bidhi cāhi* (Bihārī), or of *le* in *solah sahasr ek sau āṭh striyõ ko le šrīkṛṣṇcandr ānand se dvārkāpurī mẽ bihār karne lage* (Lāl).

*71* is the tagmemic functor of *chāṭẽhi* in *chāṭẽhi kāhe vidyā avaḍa* (Dāmodar), or of *turata* in *turata sakala loganha pahã jāhū* (Tulsī), or of *āge* in *āge tum calo* (Colloquial).

*72* is the tagmemic functor of *bhāīna kẽ* in *so ina doũ bhāīna kẽ sātati na bhaī* (Gokulnāth), or of *tīn ver* in *tav tīn ver parikramā de vār vār praṇām kar nipaṭ giḍgiḍā giḍgiḍā bharat ne rām se kahā caudah varṣ ke vīte pandrahvẽ ke pahle din mẽ jo na tum āvoge to āg lagā māĩ jal marũgā* (Mišr), or of *vidhipūrvak* in *mandir mẽ vidhipūrvak byāh huā* (Bhaṭṭ).

*81* is the tagmemic functor of *tāĩ* in *are eti vāra tāĩ kāha kia tāhã* (Dāmodar), or of *mo sãũ* in *au mo sãũ tua pragaṭa nāū* (Mājhan), or of *āp* in *aur āp samjhte ki mujh par kuch bhī asar na hogā* (Prabhākar).

*82* is the tagmemic functor of *ina* in *kāsu taṇī sāhara ina ḍhiṭhī* (Roḍā), or of *keĩ* in

*anahita tora priyā keī kīnhā* (Tulsī), or of *unko* in *nij cetnā par ā gaī unko hāsī* (Gupt).

*831* is the tagmemic functor of *āpaṇī* in *vuddhi re vaḍiro āpaṇī hārasi* (Roḍā), or of *torī* in *rāṇājī aba na rahũgī torī haṭakī* (Mīrā), or of *mere* in *sunkar mere tan badan mẽ āg lag gaī* (Yašpāl).

*832* is the tagmemic functor of *etẽ* in *mīta kāhā̃ huta etẽ kālẽ* (Dāmodar), or of *kito* in *kito miṭhāsa dayo daī ite salone rūpa* (Bihārī), or of *utnā* in *utnā paisā kidhar se āegā* (Bāzārū).

*833* is the tagmemic functor of *tāhi karī* in *tāhi karī soha ko pāmvaï* (Roḍā), or of *kāhū ke* in *kāhū ke gṛha grāma na gayaū* (Tulsī), or of *tum sā* in *tum sā dost kam miltā hai* (Colloquial).

*841* is the tagmemic functor of *e bāra* in *e bāra subara baṭahu nahĩ* (Cand), or of *ihā̃* in *ihā̃ hastinī sĩghinī au citrinī banabāsa* (Jāysī), or of *abhī tak* in *abhī tak sāhity mẽ lok-tattv kā sajag prayog sthānīy rāg ke rūp mẽ hotā thā* (Caturvedī).

*842* is the tagmemic functor of *merāī* in *khevanahāra na khevaṭa merāī* (Sūr), or of *morẽ* in *nātha eka sāsaü baṛa morẽ* (Tulsī), or of *hamāre* in *are bhāī hamāre do hī bacciyā̃ hāī* (Colloquial).

*843* is the tagmemic functor of *kaisẽ* in *kaisẽ tau to chūṭesi* (Dāmodar), or of *taise* in *saraga naraka cara acara loka bahu basata madhya mana taise* (Tulsī), or of *kaise* in *aitihāsik vikāsvād ko svīkār karnevālā vyakti yah durāgrah kar bhī kaise saktā hai* (Caturvedī).

*844* is the tagmemic functor of *ka karẽ* in *kā kiha paḍhia ka karẽ* (Dāmodar), or of *kā kāī* in *kā kāī satru janma līnyau hai* (Sūr), or of *unke* in *jahā̃ tak mujhe mālūm hai to unke koī beṭī nahĩ hai* (Colloquial).

*91* is the tagmemic functor of *aïsī veṭiyā jā gharu āvaï tāhi* in *aïsī veṭiyā jā gharu āvaï tāhi ki tūlimva koū pāvaï* (Roḍā), or of *jo merāī lāla khijhāvai so* in *jo merāī lāla khijhāvai so apanau kīnau pāvai* (Sūr), or of *banāras aise aise baṛe nagrõ mẽ jab kuch nahĩ hotā to* in *banāras aise aise baṛe nagrõ mẽ jab kuch nahĩ hotā to yah ham kyõ na kahāīge ki baliyā mẽ jo kuch hamne dekhā vah bahut hī prašāsā ke yogy hai* (Bhārtendu).

*92* is the tagmemic functor of *jamāī āẽ* in *jamāī āẽ cāulu kā̃ḍa* (Dāmodar), or of *itnī bāt balrāmjī ke mukh se nikalte hī* in *itnī bāt balrāmjī ke mukh se nikalte hī śrīkṛṣṇcandrjī ne aisā kiyā ki dvārkāpurī mẽ ghar 2 tap tijrī mirgī kṣayī dād khā̃j ādhāsīsī koṛh mahākoṛh jalādhar bhagandar kaṭhodar atisār khā̃sī šūl arddhāṅg šītāṅg jholā sannipāt ā̃v maroṛā ādi vyādhi phail gaĩ* (Lāl), or of *apne pad kī avdhi kī samāpti ho jāne par bhī* in *parantu apne pad kī avdhi kī samāpti ho jāne par bhī rājypāl apne uttarādhikārī ke pad grahaṇ tak pad dhāraṇ kiye rahegā* (Sāvidhān).

*93* is the tagmemic functor of *jab saberā huā* in *is mišr vāky mẽ jab saberā huā kriyā-višeṣaṇ-upvāky hai* (Guru), or of *tathā sadan ke any kāry par is carcā ko pūrv-vartitā dene ke liye* in *tathā sadan ke any kāry par is carcā ko pūrvvartitā dene ke liye šabd sāvidhān (pratham sāšodhan) adhiniyam 1951 dhārā 9 dvārā lupt kar*

*diye gaye* (Sāvidhān), or of *acchā bano acchā bano se* in *acchā bano acchā bano se kuch asar hogā kyā* (Colloquial).

Thus, if we interpret the set of tagmemes as the Cartesian product of the set of tagmemic functions and the set of tagmemic functors, we can symbolize any tagmeme in general as *Ff* (which is simpler than $F \cdot f$, no misunderstanding can arise here), and in particular as *P 1*, *P 21*, ..., *M 93*.

Examples:

*P 1* is the tagmeme of *kala* in *uraja ābuja-kalīya kala* (Cand), or of *ḍhāṛhī* in *māī ḍhāṛhī tumhārau* (Sūr), or of *hindū* in *ũcī jāti kā hindū vahī jiske hāth kā chuā dūsrī ũcī jāti vāle khā lẽ* (Varmā).

*P 21* is the tagmeme of *tarāga* in *halua vathu pāṇī tarāga* (Dāmodar), or of *chūṭegī* in *tahā̃ merī deha chūṭegī* (Gokulnāth), or of *thī* in *dillī kī saltanat ko akhaṇḍ banāne mẽ do baṛī-baṛī bādhāyẽ aur bhī thī ek gvāliyar dūsrā mevāṛ* (Varmā).

*P 321* is the tagmeme of *bhũjata* in *pāca divasa cyārau baraṇa bhũjata anna apāra* (Cand), or of *jānata nāhī* in *hama to kachu jānata nāhī* (Gokulnāth), or of *dikhlā cukī* in *ham ko hamārī vediyā̃ pahle ise dikhlā cukī* (Gupt).

*S 412* is the tagmeme of *likhnā* in *sab rājāõ kī mulākātõ kā hāl alag alag likhnā āvšyak nahī* (Bhārtendu), or of *karnā* in *lekin prāntīy bhāṣāõ kī upekṣā kar hindī pracār kī bāt karnā ulṭī bāt hai* (Janyug), or of *bhūl jānā* in *parantu mujhe use bhūl jānā cāhie* (Prabhākar).

*S 51* is the tagmeme of *haṭhīlī* in *atihī haṭhīlī kahyau na mānati* (Sūr), or of *bhūkhā* in *kartā nahī kyā pāp bhūkhā* (Gupt), or of *pīlā* in *vah pīlā jyādā nājuk hāī* (Bāzārū).

*S 531* is the tagmeme of *doū* in *vā rasa māī doū pāge* (Sūr), or of *pā̃ca to* in *tā mẽ pā̃ca to laukikāsakta hāī* (Gokulnāth), or of *sāt* in *abhī sāt baj gaye hāi* (Colloquial).

*O 81* is the tagmeme of *mohī* in *maiyā mohī baṛau kari lai rī* (Sūr), or of *tumko* in *māī tumko kisī chipāv ke sthān mẽ rakh dū̃gā* (Varmā), or of *āpko* in *unhõne āpko bulāyā hai* (Prabhākar).

*O 82* is the tagmeme of *kā* in *kā jāpā̃ mukha nṛpati sā̃ re mati muddha avujhjha* (Cand), or of *unhẽ* in *kīṛe-makoṛe kī tarah hāī kāṭte akṣar unhẽ* (Gupt), or of *yah* in *yah karnā acchā nahī* (Yašpāl).

*O 91* is the tagmeme of *sāha sāhaba citta dhari* in *kahaï khāna tattāra sāha sāhaba citta dhari* (Cand), or of *ki yah ḍākṭar kā narsīg hom hai kisī philosphar kā pāgalkhānā nahī* in *tumhẽ jānnā cāhie ki yah ḍākṭar kā narsīg hom hai kisī philosphar kā pāgalkhānā nahī* (Prabhākar), or of *yah bhī... ki apīl mẽ koī sārvān vidhi-prašn antargrast hai* in *uccnyāyālay yah bhī pramāṇit karegā ki apīl mẽ koī sārvān vidhi-prašn antargrast hai* (Sāvidhān).

*M 1* is the tagmeme of *koṭhe* in *saguna sāhiba sumaratā̃ re mā̃ī thāre koṭhe khaṭakī* (Mīrā), or of *daršan se* in *kyõ na log uske daršan se kṣaṇbhar dukh bisrāte* (Tripāṭhī), or of *ahīr ko* in *brāhmaṇõ ke samāj par ṭīkā-ṭippṇī karne kā avsar pākar ahīr ko sacmuc hī baṛī khušī huī* (Nāgārjun).

*M 621* is the tagmeme of *rahi* in *eka māsa dina pāca rahi gaṛha mukyau tina bāra* (Cand), or of *utarikẽ* in *taba šrīgokulanāthajī bhagavadvārtā kũbhanadāsajī ko hātha pakarikẽ anyora kī ora paravata so utarikẽ šrīgokula kõ cale* (Gokulnāth), or of *jākar* in *jākar kahā̃ hamne jalāī āg yuddh-ašānti kī* (Gupt).

*M 93* is the tagmeme of *pasīne kī jagah lohū* in *gũḍe pasīne kī jagah lohū bahāne ko juṛe* (Gupt), or of *kās ke jāne ke sthān mẽ* in *is mišr vāky mẽ jahā̃ kās gayā hai yah āšrit upvāky mukhy upvāky ke kās ke jāne ke sthān mẽ kriyā-višeṣaṇ-vākyā̃š ke badle āyā hai jo bhejũgā kriyā kī višeṣtā batlātā hai* (Guru), or of *bur na sur calī fatehpur* in *bur na sur calī fatehpur kahāvat mẽ ras bahut hai* (Colloquial).

Sometimes (especially with head tagmemes within syntagmas), it is suitable to indicate the original adjectivized functors of the classes *52* and *833* and the original adverbized functors of the classes *72*, *842*, *843* and *844*; this is done by respective functor numbers after a slant line, e.g., *F 52/1*, *F 72/51*, etc. (Eventual *F 52/52/f* and similar cases may be considered simply as *F 52/f* and so on.)

Grammaticals except copulas are not taken into consideration when symbolizing.

Copulas are both intransitive and transitive and belong to the functor classes *2*, *3*, *4*, *51* and *6*. It is necessary to point out that all tokens of these functor classes cannot appear as copulas; as a matter of fact, such tokens represent only a significant minority. Generally, copulas exert considerable influence upon the distribution of the tagmemes they are attached to: if the copula is verbal, then the whole tagmeme behaves also as verbal, and if the copula is transitive, then the whole tagmeme behaves always as transitive.

The functor number of an eventual copula may be written down after a decimal point with the functor number of the respective tagmeme, but often it is sufficient to mark such tagmemes which occasionally take on copulas with an asterisk*, e.g., *Ff**, or *P 1**, *P 31**, ..., *M 93**.

Copulas are either simple, e.g., *21*, *22*, ..., *622*, or compound, e.g., *31.21*, ..., *31.31.321*, ..., *612.611*.

Examples:

*P 1.51.321.21* is the tagmeme of *gunāhgār sābit karte hā̃ī* in *āge seṭhjī jantā ke aur sošlisṭ pārṭī ke sāmūhik naitik patan kī bāt karke šoṣkõ aur atyācāriyõ ko nahī unkī šikār jantā aur sošlisṭ pārṭī ke ām sadasyõ ko gunāhgār sābit karte hā̃ī* (Janyug).

*P 31.31.51.31.21* is the tagmeme of *banāyā huā mālūm paṛtā hai* in *bāglā bhī kisī videšī ījīniyr kā banāyā huā mālūm paṛtā hai* (Černyšev).

*P 412.31.21* is the tagmeme of *denā hī kahā jā saktā hai* in *aisā socnā apne āpko jānbūjhkar dhokhā denā hī kahā jā saktā hai* (Janyug).

*S 1.412* is the tagmeme of *dhāraṇ karnā* in *kṛpāṇ dhāraṇ karnā tathā lekar calnā sikkh dharm ke mānne kā āg samjhā jāyegā* (Sāvidhān).

*S 51.51.412* is the tagmeme of *ġalat siddh karnā* in *lekin vaijñānik taur se aitihāsik tathyõ ke ādhār par mārks ko ġalat siddh karnā sambhav nahĩ hai* (Janyug).

*O 51.411* is the tagmeme of *niruddh kiyā jānā* in *nivārak nirodh upbandhit karne vālī koī vidhi kisī vyakti ko tīn mahīne se adhik kālāvdhi ke liye niruddh kiyā jānā prādhikṛt tab tak na karegī jab tak aisā vyakti khāḍ /7/ ke upkhāḍ /k/ aur /kh/ ke adhīn sāsad-nirmit kisī vidhi ke upbandhõ ke anusār niruddh nahĩ hai* (Sāvidhān).

*M 51.612.611* is the tagmeme of *nīcā kiye huye* in *kalā ne sir nīcā kiye huye uttar diyā jānā to cāhtī hũ̃* (Varmā).

Further, I shall hint at eventual copulas by superscribed asterisks only; it is unnecessary, however, to mark the general symbol *f* in this way.

With regard to the fact that some tagmeme types are impossible in Hindi, we have to impose the following restriction:

$$\begin{aligned} Ff \neq\ & \bar{P}\ 2, \\ & \bar{P}\ 322^*, \\ & \bar{M}\ 61^*, \\ & \bar{M}\ 62, \\ & \bar{M}\ 7, \\ & \bar{M}\ 84. \end{aligned}$$

(The sign $\neq$ means "is not" or "cannot be".)

## 3. SYNTAGMAS

DEFINITION: The set of endosyntagmas is the Cartesian product resulting from the interconcatenation of the set of tagmemes by itself, and the set of exosyntagmas of the first or the *n*-th degree is the Cartesian product resulting from the interconcatenation of the set of endosyntagmas or exosyntagmas of the *n*-1th degree and the set of tagmemes, that is, any endosyntagma $= Ff \cdot Ff$, and any exosyntagma of the *n*-th degree $= Ff^{n-1} \cdot Ff$, or, generally, any syntagma $= \prod_{i} Ff_i$.

Syntagma is an ordered pair of any two tagmemes of a concrete sentence; any two tagmemes of a sentence form a syntagma because all tagmemes of a sentence are mutually connected by syntactic relationships. The network of syntactic relationships among the tagmemes in an actual sentence represents the syntactic structure of the sentence.

We may consider syntagmas to be a special case of Cartesian product, the product of the set of tagmemes by itself repeated *n* times. (I do not dare to say infinitely many times, but *n* can be fairly high, anyhow.) Hence it follows that we should make a distinction between endosyntagmas and exosyntagmas.

Two tagmemes of a sentence form an endosyntagma if they are syntactically related immediately, without any mediatory tagmeme. Two tagmemes of a sentence form an exosyntagma if they are syntactically related through at least one mediatory tagmeme; in accordance with the number of mediatory tagmemes, the degree of exosyntagmas may be distinguished. (As to the exosyntagmas, and the endosyntagmas as well, it is their hierarchy in the actual sentence structure, not the word-order, what is decisive for their interpretation.)

Syntactic relationship is the structural relationship between any two tagmemes of a sentence; any two tagmemes of a sentence constitute a syntagma (either an endosyntagma or an exosyntagma).

The set of syntactic relationships can be interpreted, again, as the Cartesian product of the set of content relationships (coordination and determination) and the set of formal relationships (association and congruency). Both the formal and content relationships are complementary: association, thus, could be delimitated as non-congruency, and coordination as non-determination.

More exactly, however, we could say:

When two (or, more) tagmemes express the same tagmemic function on the same level of the hierarchic sentence structure, then the content relationship of coordination exists between them. If one of two tagmemes depends immediately on the other (or, if one of more tagmemes depends hierarchically on others), or, in other words, if it expands the other (or, hierarchically, others), then the content relationship of determination exists between (or, among) them.

The formal relationship of association is a complete lack of any formal (from the viewpoint of morphologic categories) coincidence or similarity between two (or, among more) tagmemes. The formal relationship of congruency is such a relationship between two (or, among more) tagmemes when both (or, all) of them have one or more functionally identic markers of morphologic categories.

Consequently, coordination and association are zero relationships; this zero is, of course, meaningful, it is one of the Engels' meaningful zeros.

The formal and content relationships cannot exist separately, their actual existence in sentences is mutually conditioned: any formal relationship expresses a content relationship, and no content relationship can exist without being expressed by a formal one. Theoretically, we expect four syntactic relationships, in Hindi, however, congruency never can express coordination.

From the viewpoint of content, coordinative syntagmas are homogeneous and determinative syntagmas are heterogeneous. Homogeneous syntagmas do not exert any influence upon the quality of the sentence structure (there is no syntactic motivation for any structure within them), and it is why we can neglect them consistently and interpret them as simple tagmemes, unless they are realized by functors of different classes and expanded further on.

When we have confined our attention to the heterogeneous syntagmas consisting of two immediately related tagmemes, i.e., the endosyntagmas, we can say that they form a hierarchy of two constituents, namely the head tagmeme and the dependent tagmeme which expands the head. A dependent tagmeme can be elided from the sentence without any substantial injury of the given syntactic structure because the head can syntactically stand for the whole syntagma (provided we are ready to thrown all semantic prejudices overboard — and we are, I believe). And the other way round, any tagmeme can be expanded by a theoretically infinite number of dependent tagmemes mutually heterogeneous (or, sometimes, homogeneous), but it depends always on one head only.

As a matter of fact, syntagmas can be understood as partial arborescences resulting from the decomposition of the arborescence representing symbolically the given sentence.

Endosyntagmas are partial arborescences with two vertices, namely the root and the terminal vertex, and an arc; in other words, an endosyntagma represents a simple path whose length is equal to 1.

Exosyntagmas are of two kinds, namely one-tailed and two-tailed; the difference

is contingent on the structural position of the root of the partial arborescence representing the exosyntagma under question. One-tailed exosyntagmas are partial arborescences which coincide with a simple path whose length is 2 or more; all vertices except the terminal one have their outward demi-degree equal to one. Two-tailed exosyntagmas are partial arborescences whose root has its outward demi-degree equal to 2.

From the conception of syntagma as an ordered pair of two tagmemes (with the number of mediatory tagmemes varying from *O* to *n*) it follows that no exosyntagma can be more than two-tailed.

Having in view the symbolization of tagmemes, I symbolize syntagmas in general as *Ff* : *Ff*, *Ff* : (*Ff*) : *Ff*, ..., *Ff* : (*Ff* : ...) : *Ff*, and in particular as *P 1** : *S 1**, ..., *P 1** : (*S 31**) : *M 1**, ..., *P 1** : (*S 412** : *0 1**) : *M 51**, ....

The hierarchy of tagmemes in endosyntagmas need not be marked; we know that in our symbolization it is always the first tagmeme which is the head of the following dependent one. In exosyntagmas, however, we have to denote the roots with an index $^{r}$, e.g., the one-tailed $^{r}$*M 412** : (*01**) : *M 51** which is structurally different from the two-tailed *M 412** : ($^{r}$*0 1**) : *M 51**.

Examples:

*P* Ø : *S 1* is the syntagma of Ø : *cāu* in *sakhī mohī hari darasa kau cāu* (Sūr).

*P* Ø : *M 71* is the syntagma of Ø : *āj* in *āj vah bhārat kahã̄* (Gupt).

*P* Ø : *M 91* is the syntagma of Ø : *jaba jahã̄ jahã̄ cita jāi ... tahī tahī* in *jaba jahã̄ jahã̄ cita jāi kautuka tahī tahī* (Sūr).

*P 1* : *S 1* is the syntagma of *janaka-sutā* : *nārī* in *tina mãī mukhya rāma jo kahiyata janaka-sutā tā kī bara nārī* (Sūr).

*P 1* : *M 833* is the syntagma of *kārana* : *yā ko* in *yā ko kārana kahā* (Gokulnāth).

*P 1.21* : *S 1* is the syntagma of *badmās hai* : *ḍrāivar* in *baṛā sāhab kā ḍrāivar badmās hai* (Bāzārū).

*P 1.21* : *S 411* is the syntagma of *maut hai* : *nikalnā* in *bāhar nikalnā maut hai* (Gupt).

*P 1.21* : *S 533* is the syntagma of *mitr hãī* : *donõ* in *donõ baṛe mitr hãī* (Prabhākar).

*P 1.21* : *S 92* is the syntagma of *kalãk hai* : *bhārat mẽ ãgrezõ ke bhartī ke aḍḍe honā* in *bhārat mẽ ãgrezõ ke bhartī ke aḍḍe honā ek rāṣṭrīy kalãk hai jise rāṣṭr kā sãyukt prayatn hī dho saktā hai* (Janyug).

*P 1.31* : *M 51* is the syntagma of *pāgal hue* : *baṛe* in *tum baṛe pāgal hue* (Colloquial).

*P 1.321* : *M 51.622* is the syntagma of *ãgīkāra karāvate* : *ācho dekhikẽ* in *so śrīgusāĩjī pahilẽ tripuradāsa ko dagalā ācho dekhikẽ ãgīkāra karāvate* (Gokulnāth).

*P 1.322.21* : *O 51.412* is the syntagma of *śurū kar diyā hai* : *majbūt karnā bhī* in *sāth*

*hī capṛā majdūrõ ne apnā sãgaṭhan majbūt karnā bhī šurū kar diyā hai* (Janyug).

*P 21* : *S 81* is the syntagma of *calũgī* : *mãī bhī* in *to mãī bhī tumhāre sāth hī marne calũgī* (Varmā).

*P 21* : *O 1* is the syntagma (by contamination!) of *na rakhā jāyegā* : *bālak ko* in *caudah varṣ se kam āyu vāle kisī bālak ko kisī kārkhāne athvā khān mẽ naukar na rakhā jāyegā* (Sāvidhān).

*P 22* : *S 51* is the syntagma of *na jāpāī* : *matihīnā* in *kī na jāpāī matihīnā* (Cand).

*P 22* : *O 31* is the syntagma of *ārogehī* : *samarpyo to* in *tā tẽ tihāro samarpyo to ārogehī* (Gokulnāth).

*P 22* : *O 51.412* is the syntagma of *mānegā* : *ũcā karne ko* in *rājy apne logõ ke āhārpuṣṭi-tal aur jīvan-star ko ũcā karne ko apne prāthamik karttvyõ mẽ se mānegā* (Sāvidhān).

*P 22* : *M 612.611* is the syntagma of *dekhẽge* : *karte huye* in *kisī din usko raṇbherī kā bhī kām karte huye dekhẽge āp* (Varmā).

*P 31* : *S 52* is the syntagma of *āye* : *gãv vāle* in *itne mẽ kuch gãv vāle gaṭhrī-poṭlī bãdhe bhāgte huye āye* (Varmā).

*P 31.321.21* : *O 82* is the syntagma of *kiyā hī the ... mānte* : *use* in *pratyut use prabhu kā kiyā hī the sadā ham mānte* (Gupt).

*P 321* : *M 843* is the syntagma of *paṛh sake* : *kaise* in *ve dīn kaise paṛh sake* (Gupt).

*P 321.31* : *M 1.621* is the syntagma of *sahte rahe* : *puruṣ hokar* in *anyāy aise puruṣ hokar hāy ham sahte rahe* (Gupt).

*P 322.21* : *O 412* is the syntagma of *sīkhā nahĩ thā* : *gānā* in *ninnī ne gānā kahĩ sīkhā nahĩ thā* (Varmā).

*P 322.21* : *M 51.612.611* is the syntagma of *diyā hai* : *prakaṭ karte huye* in *pāliṭ byūro ne deš kī rājnītik aur ārthik hālat par gahrī cintā prakaṭ karte huye tamām pārṭī kameṭiyõ ko ādeš diyā hai ki ve is bāre mẽ apnī košiš aur zordār banāyẽ ki sabhī vargõ kī phaurī mãgõ ko pūrā karāne ke lie jantā kī tāqat taiyār ho* (Janyug).

*P 411.21* : *S 411* is the syntagma of *bacnā hai* : *bacnā* in *uskā bacnā merā bacnā hai* (Prabhākar).

*P 422.21* : *O 1* is the syntagma of *dahlānevālā hai* : *dil* in *tamām dṛšy atyant hī dil dahlānevālā hai* (Janyug).

*P 43.21* : *M 51.621* is the syntagma of *likhnī ... hai* : *taiyār hokar* in *hã lekhnī hṛtpatr par likhnī tujhe hai yah kathā dṛkkālimā mẽ ḍūbkar taiyār hokar sarvathā* (Gupt).

*P 51.322.21* : *O 1* is the syntagma of *khaṛā kiyā hai* : *mahal* in *kyā sādhnā ke nām par tumne bālū kā mahal khaṛā kiyā hai* (Prabhākar).

*P 532.21* : *M 1* is the syntagma of *dūnau hoi* : *nainani* in *yaha sukha sūradāsa kāī nainani dina dina dūnau hoi* (Sūr).

*P 82* : *S 81* is the syntagma of *kā* : *tũ* in *kā tũ sundari* (Cand).

*P 91.21* : *M 91* is the syntagma of *vahī ... hai jo is sāvidhān ke bhāg 3 mẽ hai* : *yadi prasāg se dūsrā arth apekṣit na ho to* in *yadi prasāg se dūsrā arth apekṣit na ho to is bhāg mẽ rājy kā vahī arth hai jo is sāvidhān ke bhāg 3 mẽ hai* (Sāvidhān).

*S 1* : *M 1* is the syntagma of *nātau* : *gṛha sāũ* in *jaba tāī ãgana khelata dekhyau māi jasudā kau pūta rī taba tāī gṛha sāũ nātau ṭūṭyau jaisāī kẫcau sūta rī* (Sūr).

*S 31* : *M 831* is the syntagma of *kiyo* : *tero* in *mo kõ to tero kiyo bhāvata hai* (Gokulnāth).

*S 51* : *M 82* is the syntagma of *baṛe* : *ve* in *ve baṛe hāī kaun* (Prabhākar).

*S 81* : *M 1* is the syntagma of *māī* : *pujārī* in *šāstr vacan ke sāmne māī choṭā sā pujārī asamarth thā* (Varmā).

*O 1* : *M 1* is the syntagma of *grantha* : *mukũdasāgara* in *aura mukũdadāsa nẽ eka mukũdasāgara grantha bhāṣā mẽ kiyo hai* (Gogulnāth).

*O 1* : *M 31* is the syntagma of *niryogytā ko* : *upjī* in *aspṛšytā se upjī kisī niryogytā ko lāgū karnā aprādh hogā jo vidhi ke anusār dāḍnīy hogā* (Sāvidhān).

*O 1* : *M 51.421* is the syntagma of *nyāyādhīš ko* : *sahmat na hone vāle* in *is khāḍ kī koī bāt sahmat na hone vāle kisī nyāyādhīš ko apne vimat-nirṇay yā rāy dene se na rokegī* (Sāvidhān).

*O 82* : *M 71* is the syntagma of *yahī* : *keval* in *māīne keval yahī kahā thā* (Varmā).

*M 1.52/412* : *O 1* is the syntagma of *bhartī karne kī* : *gorkhõ ko* in *āgrezõ ko gorkhõ ko bhartī karne kī suvidhā sirf lahrā mẽ nahĩ milī hai* (Janyug).

*M 1.612.611* : *O 1* is the syntagma of *dhāraṇ karte hue* : *pad ko* in *koī vyakti jo bhārat kā nāgrik nahĩ hai rājy ke adhīn lābh yā višvās ke kisī pad ko dhāraṇ karte hue kisī videšī rājy se koī khitāb rāṣṭrpati kī sammati ke binā svīkār na karegā* (Sāvidhān).

*M 31.31* : *M 52* is the syntagma of *bheje huye* : *sultān ke* in *nagar mẽ sultān ke bheje huye kuch naṭ ā gaye the* (Varmā).

*M 321.31* : *O 1* is the syntagma of *khāī huī* : *coṭ* in *āp coṭ khāī huī nāgan ko nahĩ jānte* (Prabhākar).

*M 51* : *M 51* is the syntagma of *kaṛī* : *baṛī* in *sarkār baṛī kaṛī nigāh rakhtī hai* (Janyug).

*M 52/1* : *M 93* is the syntagma of *šabdõ ke* : *pratham anusūcī me ullikhit kisī rājy ke athvā uske rājy-kṣetr mẽ kisī sthānīy yā any prādhikārī ke adhīn kisī prakār kī naukrī mẽ yā pad par niyukti ke pūrv us rājy ke andar nivās viṣayak koī apekṣā*

*vihit kartī ho* in *sāvidhān* (*saptam sāšodhan*) *adhiniyam 1956 dhārā 29 aur anusūcī dvārā pratham anusūcī mẽ ullikhit kisī rājy ke athvā uske rājy-kṣetr mẽ kisī sthānīy yā any prādhikārī ke adhīn kisī prakār kī naukrī mẽ yā pad par niyukti ke pūrv us rājy ke andar nivās viṣayak koī apekṣā vihit kartī ho šabdõ ke sthān par rakhe gaye* (Sāvidhān).

*M 532* : *M 91* is the syntagma of *caugune* : *sab višv mẽ sau varṣ mẽ raṇ mẽ mare jitne hare ... unse* in *sab višv mẽ sau varṣ mẽ raṇ mẽ mare jitne hare jan caugune unse yahā̃ das varṣ mẽ bhūkhõ mare* (Gupt).

*M 611.611* : *M 622* is the syntagma of *hote huye* : *chorkar* in *unkī icchā ghane jaṅgal ko chorkar nadī ke kināre hote hyue ghar pahūcne kī thī* (Varmā).

*M 621* : *M 611* is the syntagma of *uṭhkar* : *kā̃khte-kūkhte* in *bhītar vāle ne kā̃khte-kūkhte uṭhkar ṭaṭiyā̃ khol dī* (Varmā).

*M 71* : *M 71* is the syntagma of *kam* : *bahut hī* in *dṛṣṭānt aise bahut hī kam višv mẽ dekhe gaye* (Gupt).

*M 72/1* : *M 531* is the syntagma of *bhāīna kẽ* : *doū* in *so ina doū bhāīna kẽ sātati na bhaī* (Gokulnāth).

*M 91* : *M 71* is the syntagma of *isīliye ... ki tum bahādur thī* : *keval* in *anīlā ḍākṭar tum keval isīliye nahī banī ki tum bahādur thī* (Prabhākar).

In 7,000 sentences selected at random from ten representative Hindi texts (namely *Pṛthvīrāj-rāso* by Cand Bardāī, *Sūr-sāgar* by Sūrdās, *Caurāsī vaiṣṇavan kī vārtā* by Gokulnāth, *Bhārat-bhārtī* by Maithilīšaraṇ Gupt, *Mṛgnaynī* by Vṛdāvanlāl Varmā, *Ḍākṭar* by Viṣṇu Prabhākar, *Bhārat kā sāvidhān*, *Janyug* weekly, colloquial Hindi of literate Hindi speakers and *bāzārū* Hindi of illiterate non-Hindi speakers), I have found 29,467 endosyntagma tokens and 1,180 endosyntagma types. Most frequent endosyntagma types (but there are considerable differences among the works of different literary style!) are: *M 1* : *M 52* (920 tokens), *S 1* : *M 52* (842 tokens), *P 31* : *S 1* (820 tokens), *P 21* : *S 1* (642 tokens), *O 1* : *M 52* (604 tokens), *S 1* : *M 51* (581 tokens), *M 1* : *M 51* (581 tokens), *S 1* : *M 82* (577 tokens), *P 31* : *M 1* (567 tokens), *P 21* : *M 1* (562 tokens), *P 322* : *O 1* (551 tokens), *P 322* : *S 1* (535 tokens), and *M 622* : *O 1* (503 tokens). Total numbers of tokens and types of endosyntagmas in selected samples of the texts run as follows:

| Text | Number of tokens | Number of types |
|---|---|---|
| *Pṛthvīrāj-rāso* | 2,695 | 162 |
| *Sūr-sāgar* | 2,529 | 302 |
| *Caurāsī vaiṣṇavan kī vārtā* | 2,904 | 337 |
| *Bhārat-bhārtī* | 2,789 | 415 |
| *Mṛgnaynī* | 2,824 | 425 |
| *Ḍākṭar* | 2,021 | 431 |
| *Sãvidhãn* | 6,317 | 290 |
| *Janyug* | 3,884 | 364 |
| Colloquial Hindi | 1,879 | 362 |
| *Bāzārū* Hindi | 1,625 | 248 |

Some statistic conclusions drawn from the analyzed language material have been presented in my *Hindi syntagmatics.*

Endosyntagmas and exosyntagmas form a perfect system of syntagmas:

| Number of tagmemes in a sentence | 2 | 3 | 4 | 5 | ... | n |
|---|---|---|---|---|---|---|
| Number of endosyntagmas | 1 | 2 | 3 | 4 | ... | $n-1$ |
| Number of exosyntagmas | 0 | 1 | 3 | 6 | ... | $\begin{bmatrix} n-1 \\ 2 \end{bmatrix}$ |
| Number of all syntagmas | 1 | 3 | 6 | 10 | ... | $\begin{bmatrix} n \\ 2 \end{bmatrix}$ |

We cannot predict generally the distribution of exosyntagmas on their particular degrees because this is determined by the concrete sentence structure of sentences under question and not by the total number of their constituent tagmemes.

To work consistently with exosyntagmas is often too tedious and, at the same time, it shows no particular effect; the same results can be gained after an adequate systematic generalization of the analysis of endosyntagmas which is much easier. (Of course, if you may put a computer to use, then it makes no difference, but for the lazy people like me any labour-saving moment is substantial.) Moreover, the number of endosyntagma types is not so high and, consequently, their system, being not so complicated, is more lucid for us, simple mortals.

With regard to the fact that some syntagma types are impossible in Hindi, we have to impose a restriction. First, however, we should realize an adequate decomposition of the sets of tagmemic functions and tagmemic functors and assign the subsets their respective symbols, and delimitate relevant values of the tagmeme types as well:

$F = \{P, S, O, M\};$

$f = \{\emptyset, 1, 2 = \{21, 22\}, 3 = \{31, 32 = \{321, 322\}\}, 4 = \{41 = \{411, 412\}, 42 = \{421, 422\}, 43\}, 5 = \{51, 52, 53 = \{531, 532, 533\}\}, 6 = \{61 = \{611, 612\}, 62 = \{621, 622\}\}, 7 = \{71, 72\}, \{8 = 81, 82, 83 = \{831, 832, 833\}, 84 = \{841, 842, 843, 844\}\}, 9 = \{91, 92, 93\}\} = \{f_v, f_v\} = \{f', f''\},$

$\vec{f}_v = \{\emptyset, 1, 51, 52|\vec{f}_v, 71, 72|\vec{f}_v, 8, 9\},$

$f_v = \{\emptyset, 2, 3, 4, 52|f_v, 6, 72|f_v\} = \{\vec{f}_t, f_t\},$

$\vec{f}_t = \{\emptyset, 21, 31, 411, 421, 43, 52|\vec{f}_t, 611, 621, 72|\vec{f}_t\},$

$f_t = \{\emptyset, 22, 32, 412, 422, 52|f_t, 612, 622, 72|f_t\},$

$f' = \{\emptyset, 1, 2, 3, 4, 5, 71, 81, 82, 83, 9\},$

$f'' = \{\emptyset, 6, 72, 84\}.$

$Pf = P\{\emptyset, 1^*, 2, 3^*, 4^*, 5^*, 81,^* 82^*, 83^*, 9^*\};$

$Sf = S\{\emptyset, 1^*, 31^*, 321^*, 4^*, 5^*, 81^*, 82^*, 83^*, 9^*\};$

$Of = O\{\emptyset, 1^*, 31^*, 321^*, 4^*, 5^*, 81^*, 82^*, 83^*, 9^*\};$

$Mf = M\{\emptyset, 1^*, 31^*, 321^*, 4^*, 5^*, 61^*, 62, 7, 81^*, 82^*, 83^*, 84, 9^*\}.$

Then, the restriction of syntagma types is:

$$Ff : Ff \neq Ff : Pf,$$
$$\bar{P}f : Sf,$$
$$F\vec{f}_t : Of,$$
$$F\vec{f}_v : M\ 61^*,$$
$$F\vec{f}_v : M\ 62,$$
$$F\vec{f}_v : M\ 72,$$
$$F\vec{f}_v : M\ 84.$$

The last four formulas can be generalized as $F\vec{f}_v : Mf''$.

# 4. SENTENCES

DEFINITION: The set of sentences is the Cartesian product resulting from the interconcatenation of the set of *Pf* tagmemes and the set of $\bar{P}f$ tagmemes or the syntagmas (both endosyntagmas and exosyntagmas) which do not contain *Pf* tagmemes, that is, any sentence = $Pf(\bar{P}f^{n})^{n}$.

Sentence, a specific hierarchic structure of tagmemes and their mutual syntactic relationships, is thus any utterance which contains one tagmeme performing the tagmemic function of predicate and one or more tagmemes performing other tagmemic functions. Other utterances which are generally thought of as being sentences have been wittingly disregarded here: if they consist of only one tagmeme, then they afford no interest from the viewpoint of syntax because no syntactic relationship appears within them, and if they contain more tagmemes, but do not have the tagmemic function of predicate expressed, then they follow respective patterns occurring in the sentences just defined.

According to the definition, both of the following utterances are sentences:

(1) *hama bālaka* (Cand), and
(2) *anucched 13 mẽ antarviṣṭ kisī bāt ke hote hue bhī /k/ kisī sampdā ke yā usmẽ kinhĩ adhikārõ ke rājy dvārā arjan ke liye yā kinhĩ aise adhikārõ ke nirvāpan yā rūpbhedan ke liye yā /kh/ kisī sampatti kā prabandh yā to lokhit mẽ yā us sampatti kā ucit prabandh suniścit karne ke uddešy se rājy dvārā maryādit kālāvdhi ke liye le liye jāne ke liye yā /g/ do yā adhik nigmõ ko yā to lokhit mẽ yā un nigmõ mẽ se kisī kā ucit prabandh suniścit karne kī dṛṣṭi se samāmelit karne ke liye yā /gh/ nigmõ ke prabandh abhikarttāõ sacivõ aur koṣādhyakṣõ prabandh nideškõ nideškõ yā prabandhkõ ke kinhĩ adhikārõ ke yā ãšdhāriyõ ke kinhĩ matdān adhikārõ ke nirvāpan yā rūpbhedan ke liye yā /ṅ/ kisī khanij yā khanij tail ko khojne yā labdh karne ke prayoyan ke liye kisī karār paṭṭe yā anujñapti ke bal par prodbhūt hone vāle kinhĩ adhikārõ ke nirvāpan yā rūpbhedan ke liye yā kisī aise karār paṭṭe yā anujñapti ko samay se pūrv paryvast karne yā pratisāhṛt karne ke liye upbandh karne vālī vidhi kī bābat is kāraṇ ki vah anucched 14 anucched 19 yā anucched 31 dvārā pradatt adhikārõ mẽ se kisī se asãgat hai yā usko chīntī ñ yā nyūn kartī hai yah na samjhā jāyegā ki vah šūny hai* (Sāvidhān).

These two sentences differ considerably not only in the quantity and quality of semantic information (we are not concerned by this), but in their syntactic structure above all. A question arises, namely, how to measure and compare sentences (or, generally, syntactic constructions).

We can interpret the tagmemes of a sentence as a set of points in the plane and indicate the syntactic relationships among them with arrowheaded lines. In this way, any sentence may be represented by a special graph, an arborescence, whose vertices stand for the tagmemes and arcs for the syntactic relationships. Any two adjacent vertices, i.e., two vertices joined by an arc, represent an endosyntagma; all other pairs of vertices, i.e., those not joined directly by an arc, represent exosyntagmas. The tagmeme of the predicate function coincides by definition with the root of the arborescence.

Then, we can determine the syntactic parameters of the sentence. And it is suitable, I think, to work with the length $L$ and the width $W$, both of them outer and inner. I define them as follows:

If we have realized a sentence in the shape of the respective arborescence, then outer length ${}^{o}L$ of the sentence is the number of all the arcs the arborescence consists of, inner length ${}^{i}L$ of the sentence is equal to the length of the longest simple path in the arborescence (i.e., the distance between the root and the farthest terminal vertex), outer width ${}^{o}W$ of the sentence is the number of all the terminal vertices of the arborescence, and, finally, inner width ${}^{i}W$ of the sentence is equal to the highest outward demi-degree of a vertex in the arborescence. (Inner length is identic with Tesnière's centripetal phrase and Yngve's depth, if regressive, and with Tesnière's centrifugal phrase, if not; but I do not take the word-order into account.)

The four syntactic parameters are mutually interdependent, their particular values cannot be arbitrary. Such are the parameters of all possible syntactic constructions up to ${}^{o}L = 12$ (the average ${}^{o}L$ in 7,000 actual sentences selected at random is slightly over 4):

| ${}^{o}L$ | ${}^{i}L$ | ${}^{o}W$ | ${}^{i}W$ | ${}^{o}L$ | ${}^{i}L$ | ${}^{o}W$ | ${}^{i}W$ | ${}^{o}L$ | ${}^{i}L$ | ${}^{o}W$ | ${}^{i}W$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 5 | 2 | 3 | 2 | 6 | 2 | 4 | 4 |
| 2 | 1 | 2 | 2 | 5 | 2 | 3 | 3 | 6 | 2 | 5 | 3 |
| 2 | 2 | 1 | 1 | 5 | 2 | 4 | 3 | 6 | 2 | 5 | 4 |
| 3 | 1 | 3 | 3 | 5 | 2 | 4 | 4 | 6 | 2 | 5 | 5 |
| 3 | 2 | 2 | 2 | 5 | 3 | 2 | 2 | 6 | 3 | 2 | 2 |
| 3 | 3 | 1 | 1 | 5 | 3 | 3 | 2 | 6 | 3 | 3 | 2 |
| 4 | 1 | 4 | 4 | 5 | 3 | 3 | 3 | 6 | 3 | 3 | 3 |
| 4 | 2 | 2 | 2 | 5 | 4 | 2 | 2 | 6 | 3 | 4 | 2 |
| 4 | 2 | 3 | 2 | 5 | 5 | 1 | 1 | 6 | 3 | 4 | 3 |
| 4 | 2 | 3 | 3 | 6 | 1 | 6 | 6 | 6 | 3 | 4 | 4 |
| 4 | 3 | 2 | 2 | 6 | 2 | 3 | 3 | 6 | 4 | 2 | 2 |
| 4 | 4 | 1 | 1 | 6 | 2 | 4 | 2 | 6 | 4 | 3 | 2 |
| 5 | 1 | 5 | 5 | 6 | 2 | 4 | 3 | 6 | 4 | 3 | 3 |

| $^oL$ | $^iL$ | $^oW$ | $^iW$ | $^oL$ | $^iL$ | $^oW$ | $^iW$ | $^oL$ | $^iL$ | $^oW$ | $^iW$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 5 | 2 | 2 | 8 | 2 | 7 | 6 | 9 | 2 | 6 | 5 |
| 6 | 6 | 1 | 1 | 8 | 2 | 7 | 7 | 9 | 2 | 6 | 6 |
| 7 | 1 | 7 | 7 | 8 | 3 | 3 | 2 | 9 | 2 | 7 | 3 |
| 7 | 2 | 4 | 3 | 8 | 3 | 3 | 3 | 9 | 2 | 7 | 4 |
| 7 | 2 | 4 | 4 | 8 | 3 | 4 | 2 | 9 | 2 | 7 | 5 |
| 7 | 2 | 5 | 3 | 8 | 3 | 4 | 3 | 9 | 2 | 7 | 6 |
| 7 | 2 | 5 | 4 | 8 | 3 | 4 | 4 | 9 | 2 | 7 | 7 |
| 7 | 2 | 5 | 5 | 8 | 3 | 5 | 2 | 9 | 2 | 8 | 5 |
| 7 | 2 | 6 | 4 | 8 | 3 | 5 | 3 | 9 | 2 | 8 | 6 |
| 7 | 2 | 6 | 5 | 8 | 3 | 5 | 4 | 9 | 2 | 8 | 7 |
| 7 | 2 | 6 | 6 | 8 | 3 | 5 | 5 | 9 | 2 | 8 | 8 |
| 7 | 3 | 3 | 2 | 8 | 3 | 6 | 3 | 9 | 3 | 3 | 3 |
| 7 | 3 | 3 | 3 | 8 | 3 | 6 | 4 | 9 | 3 | 4 | 2 |
| 7 | 3 | 4 | 2 | 8 | 3 | 6 | 5 | 9 | 3 | 4 | 3 |
| 7 | 3 | 4 | 3 | 8 | 3 | 6 | 6 | 9 | 3 | 4 | 4 |
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| 7 | 4 | 3 | 3 | 8 | 4 | 5 | 2 | 9 | 3 | 6 | 5 |
| 7 | 4 | 4 | 2 | 8 | 4 | 5 | 3 | 9 | 3 | 6 | 6 |
| 7 | 4 | 4 | 3 | 8 | 4 | 5 | 4 | 9 | 3 | 7 | 3 |
| 7 | 4 | 4 | 4 | 8 | 4 | 5 | 5 | 9 | 3 | 7 | 4 |
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| 7 | 5 | 3 | 2 | 8 | 5 | 3 | 2 | 9 | 3 | 7 | 6 |
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| 8 | 2 | 6 | 4 | 9 | 1 | 9 | 9 | 9 | 4 | 5 | 5 |
| 8 | 2 | 6 | 5 | 9 | 2 | 5 | 4 | 9 | 4 | 6 | 3 |
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| 12 | 3 | 6 | 3 | 12 | 4 | 6 | 5 | 12 | 5 | 8 | 3 |
| 12 | 3 | 6 | 4 | 12 | 4 | 6 | 6 | 12 | 5 | 8 | 4 |

| ${}^oL$ | ${}^iL$ | ${}^oW$ | ${}^iW$ | ${}^oL$ | ${}^iL$ | ${}^oW$ | ${}^iW$ | ${}^oL$ | ${}^iL$ | ${}^oW$ | ${}^iW$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
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| 12 | 6 | 7 | 2 | 12 | 8 | 2 | 2 | 12 | 12 | 1 | 1 |
| 12 | 6 | 7 | 3 | | | | | | | | |

Generally, the syntactic parameters are positive integers and it holds that:

$$
\begin{aligned}
&{}^oL \geqslant 1,\\
&1 \leqslant {}^iL \leqslant {}^oL,\\
&1 \leqslant {}^oW \leqslant {}^oL,\\
&{}^iW \leqslant {}^oW,\\
&{}^oW > 1 \leftrightarrow {}^iW > 1,\\
&{}^oL \geqslant 1 \wedge {}^iL = {}^oL \leftrightarrow {}^oW = {}^iW = 1,\\
&{}^oL > 1 \wedge {}^iL = 1 \leftrightarrow {}^oW = {}^iW = {}^oL.
\end{aligned}
$$

(The sign $\geqslant$ reads "is equal to or greater than", $\leqslant$ reads "is equal to or less than" and $>$ reads "is greater than"; the sign of implication $\leftrightarrow$ means "implies" and the sign of conjunction $\wedge$ means "and". The sign of equality $=$ need not be explained, perhaps.)

The outer and inner parameters reflect as it were the outer and inner shape of syntactic constructions, respectively. If a pair of them is known, we can delimitate the theoretic range of the other two parameters:

$$\frac{{}^{o}L}{{}^{o}W} \leqslant {}^{i}L \leqslant {}^{o}L - {}^{o}W + 1,$$

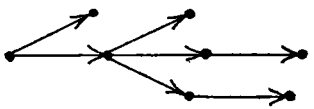
$$\frac{{}^{o}L}{{}^{o}L - {}^{o}W + 1} \leqslant {}^{i}W \leqslant {}^{o}W,$$

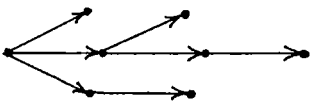
$${}^{i}L + {}^{i}W - 1 \leqslant {}^{o}L \leqslant \sum_{j=1}^{{}^{i}L} {}^{i}W^{j},$$

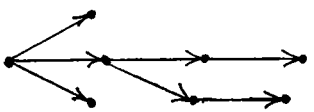
$${}^{i}W \leqslant {}^{o}W \leqslant {}^{i}W^{{}^{i}L}.$$

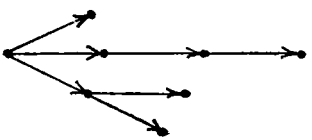
Here, I must point out that it is only the theoretic range of syntactic parameters which can be delimitated in this way. The laws of combinatorics do not allow some particular combinations of parameters within these limits (which goes without saying, I am sure).

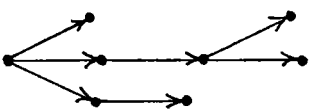
The four syntactic parameters, however, do not delimitate sentence types (or, syntactic construction types), they delimitate only groups of similar sentence types. For example, these are the possible syntactic constructions of 7, 3, 4, 3 (the order of parameters is ${}^{o}L$, ${}^{i}L$, ${}^{o}W$, ${}^{i}W$):

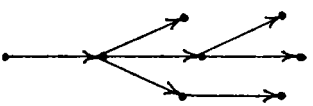
/1/ 

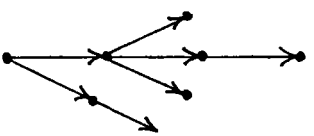
/2/ 

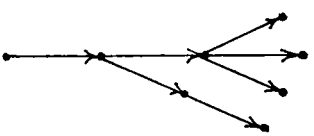
/3/ 

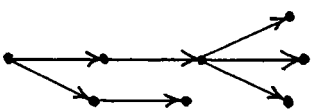
/4/ 

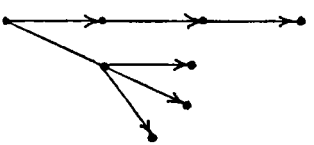
/5/ 

/6/ 

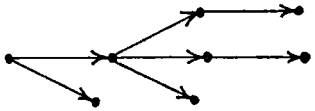
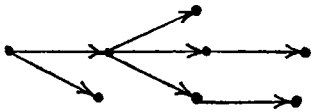
/7/ 

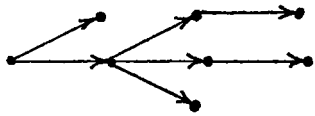
/8/ 

/9/ 

/10/ 

It is clear at the first sight that they differ structurally, although their syntactic parameters are the same. Isomorphism can be observed only among such constructions as for example (some isomorphic forms of the type /1/):

/11/  /12/ 

/13/  and so on.

But such cases have not been taken into account because the isomorphic forms of a type do not differ with regard to their syntactic structure.

Hence it follows that for a more exact and detailed delimitation of sentence structures (or, structures of syntactic constructions in general), another criterion should be found out. And the progressive numbering of the vertices provides us with such a criterion, I think: on one hand, it preserves the information given by the syntactic parameters, and, on the other, it enables us to distinguish particular types of syntactic constructions even within the limits of the groups with the same syntactic parameters.

I denote the root of a respective arborescence by a zero, and, successively, all successors by the number of their predecessor to which respective distinctive figures are added. (I say distinctive figures and not serial numbers, for this has nothing to do with any order which is irrelevant here; eventual differences in ordering show only different isomorphic forms of a particular structural type.) The root's zero may be omitted in the numbers of successors. Thus, the successors of a root 0 are 1, 2, ..., *n*; eventual successors of 1 are 11, 12, ..., 1*n*, their successors are 111, 112, ..., 11*n*, 121, 122, ..., 12*n*, ..., 1*n*1, 1*n*2, ..., 1*nn*, etc. In this way we assign respective hierarchic numbers to all vertices (i.e., in fact, tagmemes); and the hierararchic numbers exactly determine the positions of the tagmemes in the hierarchic structure of the given syntactic construction. Moreover, the hierarchic numbers assigned to the terminal tagmemes (i.e., to the tagmemes which are not further expanded) show all the simple paths incident from the root and, thus, delimitate exactly and unambiguously the structure of the whole syntactic construction, so that they may be utilized when defining it.

For example, the syntactic constructions delimitated roughly by the parameters 7, 3, 4, 3 (whose arborescences have been given above) are distinctively defined by the hierarchic numbers of their terminal tagmemes as:

/1/ 1, 21, 221, 231,
/2/ 1, 21, 221, 31,
/3/ 1, 211, 221, 3,
/4/ 1, 211, 31, 32,
/5/ 1, 211, 212, 31,
/6/ 11, 121, 122, 131,

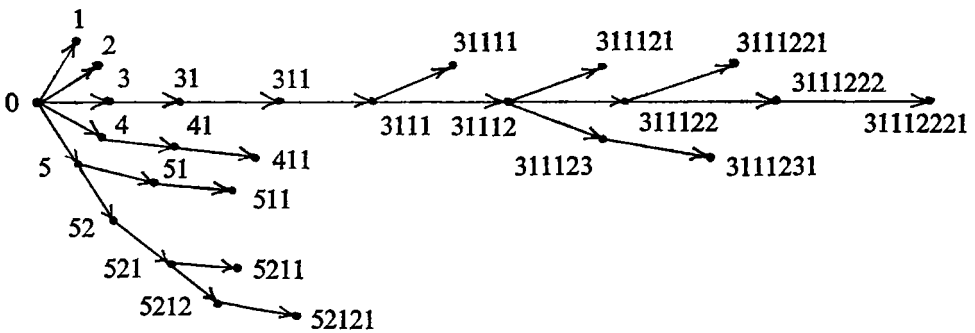
/7/ 11, 121, 13, 21, /8/ 111, 112, 113, 121,
/9/ 111, 112, 113, 21, /10/ 111, 21, 22, 23.

The structural difference of these syntactic constructions of the same group of 7, 3, 4, 3 becomes obvious especially in comparison with the isomorphic forms of the type /1/:

/11/ 1, 211, 221, 23, /12/ 11, 121, 131, 2,
/13/ 111, 121, 13, 2, and so on.

Now, let us take for example the following sentence:
*ucctamnyāyālay ko khāḍ /1/ aur /2/ dvārā dī gaī šaktiyõ par binā pratikūl prabhāv ḍāle sāsad vidhi dvārā kisī dūsre nyāyālay ko apne kṣetrādhikār kī sthānīy sīmāõ ke bhītar ucctamnyāyālay dvārā khāḍ /2/ ke adhīn prayog kī jāne vālī sab athvā kinhī šaktiyõ kā prayog karne kī šakti de sakegī* (Sāvidhān).

The respective arborescence is:




To make the example easier to survey, you may help yourself with the key:

0 = *de sakegī* (= *P 22*),
1 = *sāsad* (= *S 1*),
2 = *vidhi dvārā* (= *M 1*),
3 = *šakti* (= *O 1*),
31 = *karne kī* (= *M 52/412*),
311 = *prayog* (= *O 1*),
3111 = *šaktiyõ kā* (= *M 52/1*),
31111 = *sab athvā kinhī* (= *M 82*),
31112 = *prayog kī jāne vālī* (= *M 1.241*),
311121 = *ucctamnyāyālay dvārā* (= *M 1*),
311122 = *sīmāõ ke bhītar* (= *M 1*),
3111221 = *sthānīy* (= *M 51*),
3111222 = *kṣetrādhikār kī* (= *M 52/1*),
31112221 = *apne* (= *M 831*),
311123 = *khāḍ ... ke adhīn* (= *M 1*),
3111231 = */2/* (= *M 531*),
4 = *nyāyālay ko* (= *M 1*),

41 = *dūsre* (= *M 82*),
411 = *kisī* (= *M 82*),
5 = *binā ... ḍāle* (= *M 612*),
51 = *prabhāv* (= *O 1*),
511 = *pratikūl* (= *M 51*),
52 = *šaktiyõ par* (= *M 1*),
521 = *dī gaī* (= *M 31*),
5211 = *ucctamnyāyālay ko* (= *M 1*),
5212 = *khāḍ ... dvārā* (= *M 1*),
52121 = */1/ aur /2/* (= *M 531*).

The syntactic parameters of this sentence are 26, 8, 11, 5; but we know that there exist other structurally different syntactic constructions with the same parameters as well. Unambiguously, the sentence is defined by the hierarchic numbers of its terminal tagmemes, namely 1, 2, 31111, 311121, 3111221, 31112221, 3111231, 411, 511, 5211, 52121. Other isomorphic forms of this syntactic construction can lead to different hierarchic numbers, it is true, but their numeric structure must be the same, e.g. (to give you two extreme cases), 1, 2, 311, 411, 4211, 42121, 51111, 511121, 5111221, 5111231, 51112321, or 11111111, 1111112, 1111121, 111113, 11112, 21111, 2112, 221, 311, 4, 5; and this is substantial.

This is rather complicated, no doubt — but such is the syntactic structure of sentences and other syntactic constructions. Obviously, if there exists so rich diversity of the syntactic structure of sentences, then the notion of sentence is not very suitable for an exact work unless the diversity itself is the subject of investigation. As to me, I prefer to focus my attention to the syntagmas, especially to the endosyntagmas.

# III. SYSTEM

# 5. DESCRIPTION

DEFINITION: An adequate interpretation and classification of a syntactic unit (tagmeme, syntagma, sentence) and a relevant generalization of the obtained result is its description.

DESCRIPTION PROCEDURE

(1) Find out the cooccurrences of tagmemic functions and tagmemic functors in actual tagmemes and write them down into an $F \cdot f$ table.
(2) Find out the cooccurrences of tagmemes in actual syntagmas and write them down into a detailed three-column table of the periodic system of syntactic units, so that all evident tagmemes are recorded in the middle column and to each of them its eventual head tagmemes and dependent (or, expanding) ones, i.e., its eventual predecessors and successors (in hierarchic sense), are assigned respectively in the left and right column.
(3) After no new syntagma type can be found in your language material, generalize the obtained results and write it down into a generalized two-column table of the periodic system of syntactic units, so that the head tagmemes (predecessors) are recorded in the left column and the respective dependent (or, expanding) tagmemes (successors) are assigned to them in the right column.

DESCRIPTION RULES

*D-rule 1* A tagmeme is described by the adequate description of its tagmemic function and tagmemic functor; a syntagma is described by the adequate description of its constituent tagmemes and its internal structure, i.e., the syntactic relationship between its constituent tagmemes; a sentence is described by the adequate description of its constituent syntagmas and its internal structure, i.e., the network of syntactic relationships among its constituent syntagmas.

*D-rule 2* No grammaticals except copulas are relevant from the viewpoint of syntactic description.

*D-rule 3* Homogeneous (or, coordinative) syntagmas should be held for simple tagmemes unless their constituent tagmemes are realized by functors of different classes or expanded further on.

COOCCURRENCE OF TAGMEMIC FUNCTIONS AND TAGMEMIC FUNCTORS

Note: The sign of plus + denotes the occurrence of respective tagmemes, the sign of minus — their non-occurrence.

| | *P* | *S* | *O* | *M* |
|---|---|---|---|---|
| *Ø* | + | + | + | + |
| *1** | + | + | + | + |
| *21* | + | — | — | — |
| *22* | + | — | — | — |
| *31** | + | + | + | + |
| *321** | + | + | + | + |
| *322** | + | — | — | — |
| *411** | + | + | + | + |
| *412** | + | + | + | + |
| *421** | + | + | + | + |
| *422** | + | + | + | + |
| *43** | + | + | + | + |
| *51** | + | + | + | + |
| *52** | + | + | + | + |
| *531** | + | + | + | + |
| *532** | + | + | + | + |
| *533** | + | + | + | + |
| *611** | — | — | — | + |
| *612** | — | — | — | + |
| *621* | — | — | — | + |
| *622* | — | — | — | + |
| *71* | — | — | — | + |
| *72* | — | — | — | + |
| *81** | + | + | + | + |
| *82** | + | + | + | + |
| *831** | + | + | + | + |
| *832** | + | + | + | + |
| *833** | + | + | + | + |
| *841* | — | — | — | + |
| *842* | — | — | — | + |
| *843* | — | — | — | + |
| *844* | — | — | — | + |
| *91** | + | + | + | + |
| *92** | + | + | + | + |
| *93** | + | + | + | + |

PERIODIC SYSTEM OF SYNTACTIC UNITS

Note: In this table, although detailed in the middle column, probable predecessors and successors are indicated by general symbols only, otherwise the system would spread over a hundred of pages; for details, students may refer to the decomposition of the sets of tagmemic functions, tagmemic functors and tagmemes themselves as it has been presented above. Occasional irregularities of syntactic constructions like anacolutha, contaminations, zeugmas, etc., are not taken into account here. If no predecessor is possible, the sign # is used at the respective place in the left column; necessary conditions are given in the parentheses ( ), the sign of implication $\leftrightarrow$ means "implies" and the sign of disjunction $\vee$ stands for "or" in the inclusive sense.

| Probable predecessors | Evident tagmemes | Probable successors |
|---|---|---|
| # | **P Ø** | *Sf*<br>*Of*<br>*Mf* |
| # | **P 1*** | *Sf*<br>*Mf'*<br>(*P 1.*$f_t\leftrightarrow$) *Of*<br>(*P 1.*$f_v\leftrightarrow$) *Mf''* |
| # | **P 21** | *Sf*<br>*Mf* |
| # | **P 22** | *Sf*<br>*Of*<br>*Mf* |
| # | **P 31*** | *Sf*<br>*Mf*<br>(*P 31.*$f_t\leftrightarrow$) *Of* |
| # | **P 321*** | *Sf*<br>*Of*<br>*Mf* |
| # | **P 322*** | *Sf*<br>*Of*<br>*Mf* |
| # | **P 411*** | *Sf*<br>*Mf*<br>(*P 411.*$f_t\leftrightarrow$) *Of* |
| # | **P 412*** | *Sf*<br>*Of*<br>*Mf* |

| | | |
|---|---|---|
| # | **P 421*** | *Sf*<br>*Mf*<br>(*P 421.*$f_t$↔) *Of* |
| # | **P 422*** | *Sf*<br>*Of*<br>*Mf* |
| # | **P 43*** | *Sf*<br>*Mf*<br>(*P 43.*$f_t$↔) *Of* |
| # | **P 51*** | *Sf*<br>*Mf′*<br>(*P 51.*$f_t$↔) *Of*<br>(*P 51.*$f_v$↔) *Mf″* |
| # | **P 52*** | *Sf*<br>*Mf′*<br>(*P 52*/$f_t$ ∨ *P 52/f.*$f_t$↔) *Of*<br>(*P 52*/$f_v$ ∨ *P 52/f.*$f_v$↔) *Mf″* |
| # | **P 531*** | *Sf*<br>*Mf′*<br>(*P 531.*$f_t$↔) *Of*<br>(*P 531.*$f_v$↔) *Mf″* |
| # | **P 532*** | *Sf*<br>*Mf′*<br>(*P 532.*$f_t$↔) *Of*<br>(*P 532.*$f_v$↔) *Mf″* |
| # | **P 533*** | *Sf*<br>*Mf′*<br>(*P 533.*$f_t$↔) *Of*<br>(*P 533.*$f_v$↔) *Mf″* |
| # | **P 81*** | *Sf*<br>*Mf′*<br>(*P 81.*$f_t$↔) *Of*<br>(*P 81.*$f_v$↔) *Mf″* |
| # | **P 82*** | *Sf*<br>*Mf′*<br>(*P 82.*$f_t$↔) *Of*<br>(*P 82.*$f_v$↔) *Mf″* |
| # | **P 831*** | *Sf*<br>*Mf′*<br>(*P 831.*$f_t$↔) *Of*<br>(*P 831.*$f_v$↔) *Mf″* |

| | | |
|---|---|---|
| # | **P 832*** | *Sf*<br>*Mf'*<br>(*P 832.*$f_t$↔) *Of*<br>(*P 832.*$f_v$↔) *Mf''* |
| # | **P 833*** | *Sf*<br>*Mf'*<br>(*P 833.*$f_t$↔) *Of*<br>(*P 833.*$f_v$↔) *Mf''* |
| # | **P 91*** | *Sf*<br>*Mf'*<br>(*P 91.*$f_t$↔) *Of*<br>(*P 91.*$f_v$↔) *Mf''* |
| # | **P 92*** | *Sf*<br>*Mf'*<br>(*P 92.*$f_t$↔) *Of*<br>(*P 92.*$f_v$↔) *Mf''* |
| # | **P 93*** | *Sf*<br>*Mf'*<br>(*P 93.*$f_t$↔) *Of*<br>(*P 93.*$f_v$↔) *Mf''* |
| *Pf* | **S Ø** | *Of*<br>*Mf* |
| *Pf* | **S 1*** | *Mf'*<br>(*S 1.*$f_t$↔) *Of*<br>(*S 1.*$f_v$↔) *Mf''* |
| *Pf* | **S 31*** | *Mf*<br>(*S 31.*$f_t$↔) *Of* |
| *Pf* | **S 321*** | *Of*<br>*Mf* |
| *Pf* | **S 411*** | *Mf*<br>(*S 411.*$f_t$↔) *Of* |
| *Pf* | **S 412*** | *Of*<br>*Mf* |
| *Pf* | **S 421*** | *Mf*<br>(*S 421.*$f_t$↔) *Of* |
| *Pf* | **S 422*** | *Of*<br>*Mf* |
| *Pf* | **S 43*** | *Mf*<br>(*S 43.*$f_t$↔) *Of* |

| | | |
|---|---|---|
| *Pf* | **S 51*** | *Mf′*<br>(*S 51.*$f_t$↔) *Of*<br>(*S 51.*$f_v$↔) *Mf″* |
| *Pf* | **S 52*** | *Mf′*<br>(*S 52**/$f_t$ ∨ *S 52/f.*$f_t$↔) *Of*<br>(*S 52**/$f_v$ ∨ *S 52/f.*$f_v$↔) *Mf″* |
| *Pf* | **S 531*** | *Mf′*<br>(*S 531.*$f_t$↔) *Of*<br>(*S 531.*$f_v$↔) *Mf″* |
| *Pf* | **S 532*** | *Mf′*<br>(*S 532.*$f_t$↔) *Of*<br>(*S 532.*$f_v$↔) *Mf″* |
| *Pf* | **S 533*** | *Mf′*<br>(*S 533.*$f_t$↔) *Of*<br>(*S 533.*$f_v$↔) *Mf″* |
| *Pf* | **S 81*** | *Mf′*<br>(*S 81.*$f_t$↔) *Of*<br>(*S 81.*$f_v$↔) *Mf″* |
| *Pf* | **S 82*** | *Mf′*<br>(*S 82.*$f_t$↔) *Of*<br>(*S 82.*$f_v$ ↔) *Mf″* |
| *Pf* | **S 831*** | *Mf′*<br>(*S 831.*$f_t$↔) *Of*<br>(*S 831.*$f_v$↔) *Mf″* |
| *Pf* | **S 832*** | *Mf′*<br>(*S 832.*$f_t$↔) *Of*<br>(*S 832.*$f_v$↔) *Mf″* |
| *Pf* | **S 833*** | *Mf′*<br>(*S 833.*$f_t$↔) *Of*<br>(*S 833.*$f_v$↔) *Mf″* |
| *Pf* | **S 91*** | *Mf′*<br>(*S 91.*$f_t$↔) *Of*<br>(*S 91.*$f_v$↔) *Mf″* |
| *Pf* | **S 92*** | *Mf′*<br>(*S 92.*$f_t$↔) *Of*<br>(*S 92.*$f_v$↔) *Mf″* |
| *Pf* | **S 93*** | *Mf′*<br>(*S 93.*$f_t$↔) *Of*<br>(*S 93.*$f_v$↔) *Mf″* |

| | | |
|---|---|---|
| $Ff_t$<br>$Ff.f_t$ | **O Ø** | *Of*<br>*Mf* |
| $Ff_t$<br>$Ff.f_t$ | **O 1*** | *Mf′*<br>(*O 1.*$f_t\leftrightarrow$) *Of*<br>(*O 1.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 31*** | *Mf*<br>(*O 31.*$f_t\leftrightarrow$) *Of* |
| $Ff_t$<br>$Ff.f_t$ | **O 321*** | *Of*<br>*Mf* |
| $Ff_t$<br>$Ff.f_t$ | **O 411*** | *Mf*<br>(*O 411.*$f_t\leftrightarrow$) *Of* |
| $Ff_t$<br>$Ff.f_t$ | **O 412*** | *Of*<br>*Mf* |
| $Ff_t$<br>$Ff.f_t$ | **O 421*** | *Mf*<br>(*O 421.*$f_t\leftrightarrow$) *Of* |
| $Ff_t$<br>$Ff.f_t$ | **O 422*** | *Of*<br>*Mf* |
| $Ff_t$<br>$Ff.f_t$ | **O 43*** | *Mf*<br>(*O 43.*$f_t\leftrightarrow$) *Of* |
| $Ff_t$<br>$Ff.f_t$ | **O 51*** | *Mf′*<br>(*O 51.*$f_t\leftrightarrow$) *Of*<br>(*O 51.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 52*** | *Mf′*<br>(*O 52*/*$f_t \vee$ *O 52/f.*$f_t\leftrightarrow$) *Of*<br>(*O 52*/*$f_v \vee$ *O 52/f.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 531*** | *Mf′*<br>(*O 531.*$f_t\leftrightarrow$) *Of*<br>(*O 531.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 532*** | *Mf′*<br>(*O 532.*$f_t\leftrightarrow$) *Of*<br>(*O 532.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 533*** | *Mf′*<br>(*O 533.*$f_t\leftrightarrow$) *Of*<br>(*O 533.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 81*** | *Mf′*<br>(*O 81.*$f_t\leftrightarrow$) *Of*<br>(*O 81.*$f_v\leftrightarrow$) *Mf″* |
| $Ff_t$<br>$Ff.f_t$ | **O 82*** | *Mf′*<br>(*O 82.*$f_t\leftrightarrow$) *Of*<br>(*O 82.*$f_v\leftrightarrow$) *Mf″* |

| | | |
|---|---|---|
| $Ff_t$<br>$Ff.f_t$ | **O 831*** | *Mf'*<br>*(O 831.$f_t$↔) Of*<br>*(O 831.$f_v$↔) Mf"* |
| $Ff_t$<br>$Ff.f_t$ | **O 832*** | *Mf'*<br>*(O 832.$f_t$↔) Of*<br>*(O 832.$f_v$↔) Mf"* |
| $Ff_t$<br>$Ff.f_t$ | **O 833*** | *Mf'*<br>*(O 833.$f_t$↔) Of*<br>*(O 833.$f_v$↔) Mf"* |
| $Ff_t$<br>$Ff.f_t$ | **O 91*** | *Mf'*<br>*(O 91.$f_t$↔) Of*<br>*(O 91.$f_v$↔) Mf"* |
| $Ff_t$<br>$Ff.f_t$ | **O 92*** | *Mf'*<br>*(O 92.$f_t$↔) Of*<br>*(O 92.$f_v$↔) Mf"* |
| $Ff_t$<br>$Ff.f_t$ | **O 93*** | *Mf'*<br>*(O 93.$f_t$↔) Of*<br>*(O 93.$f_v$↔) Mf"* |
| *Ff* | **M Ø** | *Of*<br>*Mf* |
| *Ff* | **M 1*** | *Mf'*<br>*(M 1.$f_t$↔) Of*<br>*(M 1.$f_v$↔) Mf"* |
| *Ff* | **M 31*** | *Mf*<br>*(M 31.$f_t$↔) Of* |
| *Ff* | **M 321*** | *Of*<br>*Mf* |
| *Ff* | **M 411*** | *Mf*<br>*(M 411.$f_t$↔) Of* |
| *Ff* | **M 412*** | *Of*<br>*Mf* |
| *Ff* | **M 421*** | *Mf*<br>*(M 421.$f_t$↔) Of* |
| *Ff* | **M 422*** | *Of*<br>*Mf* |
| *Ff* | **M 43*** | *Mf*<br>*(M 43.$f_t$↔) Of* |
| *Ff* | **M 51*** | *Mf'*<br>*(M 51.$f_t$↔) Of*<br>*(M 51.$f_v$↔) Mf"* |

| | | |
|---|---|---|
| *Ff* | **M 52*** | *Mf′*<br>(*M 52*/$f_t$ ∨ *M 52*/*f*.$f_t$↔) *Of*<br>(*M 52*/$f_v$ ∨ *M 52*/*f*.$f_v$↔) *Mf″* |
| *Ff* | **M 531*** | *Mf′*<br>(*M 531*.$f_t$↔) *Of*<br>(*M 531*.$f_v$↔) *Mf″* |
| *Ff* | **M 532*** | *Mf′*<br>(*M 532*.$f_t$↔) *Of*<br>(*M 532*.$f_v$↔) *Mf″* |
| *Ff* | **M 533*** | *Mf′*<br>(*M 533*.$f_t$↔) *Of*<br>(*M 533*.$f_v$↔) *Mf″* |
| *Ff*$_v$<br>*Ff*.$f_v$ | **M 611*** | *Mf*<br>(*M 611*.$f_t$↔) *Of* |
| *Ff*$_v$<br>*Ff*.$f_v$ | **M 612*** | *Mf*<br>(*M 612*.$f_t$↔) *Of* |
| *Ff*$_v$<br>*Ff*.$f_v$ | **M 621** | *Mf* |
| *Ff*$_v$<br>*Ff*.$f_v$ | **M 622** | *Of*<br>*Mf* |
| *Ff* | **M 71** | *Mf′* |
| *Ff*$_v$<br>*Ff*.$f_v$ | **M 72** | *Mf*<br>(*M 72*/$f_t$↔) *Of*<br>(*M 72*/$f_v$↔) *Mf″* |
| *Ff* | **M 81*** | *Mf′*<br>(*M 81*.$f_t$↔) *Of*<br>(*M 81*.$f_v$↔) *Mf″* |
| *Ff* | **M 82*** | *Mf′*<br>(*M 82*.$f_t$↔) *Of*<br>(*M 82*.$f_v$↔) *Mf″* |
| *Ff* | **M 831*** | *Mf′*<br>(*M 831*.$f_t$↔) *Of*<br>(*M 831*.$f_v$↔) *Mf″* |
| *Ff* | **M 832*** | *Mf′*<br>(*M 832*.$f_t$↔) *Of*<br>(*M 832*.$f_v$↔) *Mf″* |
| *Ff* | **M 833*** | *Mf′*<br>(*M 833*.$f_t$↔) *Of*<br>(*M 833*.$f_v$↔) *Mf″* |

| | | |
|---|---|---|
| $Ff_v$<br>$Ff.f_v$ | **M 841** | $Mf'$ |
| $Ff_v$<br>$Ff.f_v$ | **M 842** | $Mf'$ |
| $Ff_v$<br>$Ff.f_v$ | **M 843** | $Mf'$ |
| $Ff_v$<br>$Ff.f_v$ | **M 844** | $Mf'$ |
| $Ff$ | **M 91*** | $Mf'$<br>$(M\ 91.f_t\leftrightarrow)\ Of$<br>$(M\ 91.f_v\leftrightarrow)\ Mf''$ |
| $Ff$ | **M 92*** | $Mf'$<br>$(M\ 92.f_t\leftrightarrow)\ Of$<br>$(M\ 92.f_v\leftrightarrow)\ Mf''$ |
| $Ff$ | **M 93*** | $Mf'$<br>$(M\ 93.f_t\leftrightarrow)\ Of$<br>$(M\ 93.f_v\leftrightarrow)\ Mf''$ |

PERIODIC SYSTEM OF SYNTACTIC UNITS GENERALIZED

| Probable predecessors | Probable successors |
|---|---|
| $Pf$ | $Sf$ |
| $Ff_t$<br>$Ff.f_t$ | $Of$ |
| $Ff_v$<br>$Ff.f_v$ | $Mf''$ |
| $Ff$ | $Mf'$ |

# 6. GENERATION

DEFINITION: A quantitative change of the structure of a syntactic unit (tagmeme, syntagma, sentence) is its generation.

GENERATION PROCEDURE

(1) Look for the type symbol of the tagmeme you want to expand in the generalized periodic system of syntactic units, and that in its left column if you want to generate downward (i.e., from a predecessor toward a successor) or in its right column if you want to generate upward (i.e., from a successor toward a predecessor).
(2) If you generate downward, take out one or more expanding tagmemes of those symbolized generally at the respective place in the right column; if you generate upward, take out a head tagmeme of those symbolized in the left column.
(3) To continue, look for the symbol of the selected tagmeme (or, tagmemes) again in the left or right column (which depends on the direction of your generation process) and repeat the generation; you may go on until you get as far as a terminal tagmeme or until you are satisfied.

GENERATION RULES

*G-rule 1* There can be only one head of any dependent tagmeme; such two tagmemes and their hierarchic relationship form an endosyntagma.

*G-rule 2* There can be more tagmemes dependent on any head; such dependent tagmemes are mutually related only exosyntagmatically.

*G-rule 3* There can be only one root in an exosyntagma of any degree (both one-tailed and two-tailed); the root is one of the two constituent tagmemes in one-tailed exosyntagmas and it is a mediatory tagmeme in two-tailed ones.

# 7. TRANSFORMATION

DEFINITION: A qualitative change of the structure of a syntactic unit (tagmeme, syntagma, sentence) is its transformation.

TRANSFORMATION PROCEDURE

(1) In the table of the transformation of tagmemic functors, look for the probable transformations of the tagmemic functors of the syntagma you want to transform.
(2) In the table of the cooccurrence of tagmemic functions and tagmemic functors, find out the tagmemic functions the transformed tagmemic functors can realize.
(3) Form a transformed syntagma and check up in the table of the periodic system of syntactic units whether the resultant transformed syntagma is syntactically acceptable.

TRANSFORMATION RULES

*T-rule 1* By definition, any tagmemic functor may be transformed into *Ø* and *9* and vice versa, and into itself as well.

*T-rule 2* Any tagmemic functor with a copula behaves like that without it, unless the aspect of verbality or transitivity is changed.

*T-rule 3* The adjectivized and adverbized tagmemic functors behave as if not adjectivized or adverbized.

TRANSFORMATION OF TAGMEMIC FUNCTORS

Note: The sign of transformation → means "can be transformed into".

(∀*Ø*) *Ø* → *Ø*, *1**, *21*, etc. (see *T-rule 1*).
(∀*1**) *1** → *Ø*, *1**, *52*/1*, etc. (see *T-rule 3*), 72/*1*, etc. (see *T-rule* 3), *91**, *92**, *93**;
(∃*1**) *1** → *21*, *22*, *31**, *321**, *322**, *411**, *412**, *421**, *422**, *43**, *51**, *52*/31*, etc. (see *T-rule 3*), *531**, *532**, *533**, *611**, *612**, *621*, *622*, *71*, *72/31*, etc. (see *T-rule 3*).

(∀*21*) *21* → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *621*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*21*) *21* → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

(∀*22*) *22* → *Ø*, *21*, *22*, *31**, *321**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*22*) *22* → *1**, *322**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/1*, etc. (see *T-rule 3*).

(∀*31**) *31** → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *621*, 72/31, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*31**) *31** → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

(∀*321**) *321** → *Ø*, *21*, *22*, *31**, *321**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*321**) *321** → *1**, *322**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/1*, etc. (see *T-rule 3*).

(∀*322**) *322** → *Ø*, *21*, *22*, *31**, *321**, *322**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*322**) *322** → *1**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/1*, etc. (see *T-rule 3*).

(∀*411**) *411** → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule* 3), *611**, *621*, *72/31*, etc. (see *T-rule 3*) *91**, *92**, *93**;

(∃*411**) *411** → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

(∀*412**) *412** → *Ø*, *21*, *22*, *31**, *321**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*412**) *412** → *1**, *322**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/1*, etc. (see *T-rule 3*).

(∀*421**) *421** → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *621*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*421**) *421** → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

(∀*422**) *422** → *Ø*, *21*, *22*, *31**, *321**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

(∃*422**) *422** → *1**, *322**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72*/1, etc. (see *T-rule 3*).

(∀*43**) *43** → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *621*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 43^*$) *43** → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 51^*$) *51** → *Ø*, *51**, *52*/51*, etc. (see *T-rule 3*), *72/51*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 51^*$) *51** → *1**, *21*, *22*, *31**, *321**, *322**, *411**, *412**, *421**, *422**, *43**, *52*/1*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 52^*$) *52** → functors in accordance with *T-rule 1* and *T-rule 3*.

($\forall 531^*$) *531** → *Ø*, *52*/531*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/531*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 531^*$) *531** → *1**, *21*, *22*, *31**, *321**, *322**, *411**, *412**, *421**, *422**, *52*/1*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 532^*$) *532** → *Ø*, *52*/531*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/531*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 532^*$) *532** → *1**, *21*, *22*, *31**, *321**, *322**, *411**, *412**, *421**, *422**, *43**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *611**, *612**, *621*, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 533^*$) *533** → *Ø*, *52*/531*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/531*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 533^*$) *533** → *1**, *21*, *22*, *31**, *321**, *322**, *411**, *412**, *421**, *422**, *43**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *611**, *612**, *621*, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 611^*$) *611** → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *621*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 611^*$) *611** → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *52**/1, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 612^*$) *612** → *Ø*, *21*, *22*, *31**, *321**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 612^*$) *612** → *1**, *322**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/1*, etc. (see *T-rule 3*).

($\forall 621$) *621* → *Ø*, *21*, *31**, *411**, *421**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *621*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 621$) *621* → *1**, *22*, *321**, *322**, *412**, *422**, *51**, *53*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *612**, *622*, *72/1*, etc. (see *T-rule 3*).

($\forall 622$) *622* → *Ø*, *21*, *22*, *31**, *321**, *411**, *412**, *421**, *422**, *43**, *52*/31*, etc. (see *T-rule 3*), *611**, *612**, *621*, *622*, *72/31*, etc. (see *T-rule 3*), *91**, *92**, *93**;

($\exists 622$) *622* → *1**, *322**, *51**, *52*/1*, etc. (see *T-rule 3*), *531**, *532**, *533**, *72/1*, etc. (see *T-rule 3*).

($\forall 71$) *71* → *Ø*, *91**, *92**, *93**;

($\exists 71$) *71* → *1**.

($\forall 72$) *72* → functors in accordance with *T-rule 1* and *T-rule 3*.

(∀*81**) *81** → *Ø*, *81**, *831**, *833*/81*, etc. (see *T-rule 3*), *842/831*, etc. (see *T-rule 3*), *844/831*, etc. (see *T-rule 3*), *91**, *92**, *93**.

(∀*82**) *82** → *Ø*, *82**, *833*/82*, etc. (see *T-rule 3*), *844/833*, etc. (see *T-rule 3*), *91**, *92**, *93**.

(∀*831**) *831** → *Ø*, *81**, *831**, *833*/81*, etc. (see *T-rule 3*), *842/831*, etc. (see *T-rule 3*), *844/833*, etc. (see *T-rule 3*), *91**, *92**, *93**.

(∀*832**) *832** → *Ø*, *832**, *833*/832*, etc. (see *T-rule 3*), *843/832*, etc. (see *T-rule 3*), *844/833*, etc. (see *T-rule 3*), *91**, *92**, *93**.

(∀*833**) *833** → functors in accordance with *T-rule 1* and *T-rule 3*.

(∀*841*) *841* → *Ø*, *833/841*, etc. (see *T-rule 3*), *841*, *844/833*, etc. (see *T-rule 3*), *91**, *92**, *93**.

(∀*842*) *842* → functors in accordance with *T-rule 1* and *T-rule 3*.

(∀*843*) *843* → functors in accordance with *T-rule 1* and *T-rule 3*.

(∀*844*) *844* → functors in accordance with *T-rule 1* and *T-rule 3*.

(∀*91**) *91** → functors in accordance with *T-rule 1*.

(∀*92**) *92** → functors in accordance with *T-rule 1*.

(∀*93**) *93** → functors in accordance with *T-rule 1*.

# APPENDIX

## EXERCISES

(1) Interpret and symbolize the tagmemes of the following sentences:
(a) *ulaṭī caracā goraṣa gāvaī* (Gorakhnāth),
(b) *koi kāhu kā haṭā na mānai* (Kabīr),
(c) *būjhani lāgī navala bāla nādalāla piyahī taba* (Nand),
(d) *tum kisī bāt kī cintā mat karo* (Lāl),
(e) *mãine to vaise hī pūchā* (Varmā),
(f) *rupye kī rasīd aur ciṭṭhī kā javāb āyā* (Yašpāl),
(g) *āp jaisõ ke sahāre hī bhagvān kī duniyā caltī hai* (Prabhākar).

(2) Give at least one actual example of each of the following tagmeme types:
(a) *P 22*,
(b) *P 51.31.21*,
(c) *S 411*,
(d) *S 81*,
(e) *O 51.412*,
(f) *O 82*,
(g) *M 31*,
(h) *M 611.611*,
(i) *M 91*.

(3) Interpret and symbolize the endosyntagmas of the following sentences:
(a) *khelana kãī misa kũvari rādhikā nāda-mahari kãī āī* (Sūr),
(b) *tiya mukha rati ārābha kī nahī jhūṭhiyai miṭhāya* (Bihārī),
(c) *sivil sarvis kā bairisṭrī kā ījīniyrī kā imtihān dene ko vilāyat jānā hogā* (Bhārtendu),
(d) *donõ tīkhe turag ucke aur uṛe yān ko le* (Hariaudh),
(e) *ājkal sarīkhā ke badle jaisā kā pracār baṛh rahā hai* (Guru),
(f) *mere mũh se gaune kī bāt sunkar baṛī khuš huī* (Nāgārjun),
(g) *aisā socnā apne āpko jānbūjhkar dhokhā denā hī kahā jā saktā hai* (Janyug).

(4) Give at least one actual example of each of the following endosyntagma types:
(a) *P 412.21* : *O 81*,
(b) *P 91.31* : *S 82*,
(c) *S 1* : *M 52/1*,
(d) *S 51* : *M 832*,
(e) *O 1* : *M 531*,
(f) *O 412* : *O 411*,
(g) *M 1* : *M 1*,
(h) *M 31.612* : *O 1*,
(i) *M 51* : *M 91*.

(5) Interpret and symbolize the exosyntagmas of the following sentences:
(a) *likhi kaggada sava vidhi vivari rāja rīti cahuẽna diva kaggada tāsu dūta kara vara kāitha dhrammāna* (Cand),
(b) *dina prati kaisãi sahi parati dūdha dahī kī hāni* (Sūr),
(c) *ye rupayāna ko kṛṣṇadāsa vāre kũā ko mohaṛo banavāiyo* (Gokulnāth),
(d) *vah bhadr bhārat sarvdā bhū-lok-netā siddh hai* (Gupt),
(e) *kãpte huye kaṇṭh ko sãbhālkar jāsūs ne kahā jahãpanāh ġayāsuddīn khiljī kī dostī mevāṛ ke kāfir rānā ke sāth jyõ kī tyõ cal rahī hai* (Varmā),
(f) *āj hī unhẽ vāpis lauṭnā hai* (Prabhākar),
(g) *koī mantrī jo nirantar chaḥ mās kī kisī kālāvdhi tak sãsad ke kisī sadan kā sadasy na rahe us kālāvdhi kī samāpti par mantrī na rahegā* (Sāvidhān).

(6) Give at least one actual example of each of the following exosyntagma types:
(a) *ʳP 1.31 : (S 1) : M 52/411,*
(b) *ʳP 21 : (S 1) : M 31.31,*
(c) *S 1 : (ʳP 21) : M 31.31,*
(d) *M 52/1 : (ʳP 421.21) : M 532,*
(e) *ʳP 51.322 : (O 1) : M 82,*
(f) *M 51 : (ʳS 1) : M 833,*
(g) *M 832 : (ʳP 51.21 : S 1) : M 82,*
(h) *M 52/531 : (ʳO 1 : M 422) : O 1,*
(i) *S 81 : (ʳP 21 : M 622 : O 1) : M 831.*

(7) Determine the group of each of the following sentences by their syntactic parameters:
(a) *keĩ e sovia* (Dāmodar),
(b) *maiyā mãi apanãi kara khaihãũ* (Sūr),
(c) *pāchẽ padmanābhadāsa ghara jāya sevā karana lāge* (Gokulnāth),
(d) *prabhu ne diyā yah jñān hamko sṛṣṭi ke ārambh mẽ* (Gupt),
(e) *tab avsar āne par šatru kā širocched karne mẽ hāth nahĩ kãp jāygā* (Varmā),
(f) *rājy-sabhā yathāsambhav šīghr apne kisī sadasy ko apnā upsabhāpati cunegī* (Sāvidhān),
(g) *indaur zile kī grām-pācāytõ ne hāl hī mẽ naye naye ṭaiks lagāne kā kadam uṭhākar jantā kī khālī jebõ ko aur khālī karne kī košiš šurū kar dī hai* (Janyug).

(8) Give at least one actual example of each of the following sentence types groups as determined by the syntactic parameters:
(a) 3, 3, 1, 1,
(b) 4, 1, 4, 4,
(c) 6, 3, 4, 2,
(d) 7, 2, 5, 3,
(e) 9, 3, 7, 4,
(f) 9, 3, 7, 5,
(g) 12, 6, 4, 3.

(9) Delimitate the theoretic range of the inner syntactic parameters if the outer ones are:

(a) 4, 2,
(b) 5, 3,
(c) 6, 4,
(d) 7, 4,
(e) 8, 7,
(f) 9, 6,
(g) 12, 8.

(10) Delimitate the theoretic range of the outer syntactic parameters if the inner ones are:

(a) 2, 3,
(b) 3, 2,
(c) 4, 2,
(d) 4, 3,
(e) 6, 7,
(f) 9, 5,
(g) 3, 9.

(11) By the hierarchic numbers of their terminal tagmemes, define all the sentence types of each of the groups determined by the following syntactic parameters:

(a) 5, 3, 3, 3,
(b) 6, 3, 3, 3,
(c) 6, 3, 4, 4,
(d) 8, 4, 5, 2,
(e) 9, 2, 5, 4,
(f) 9, 5, 4, 2,
(g) 10, 3, 8, 7.

(12) By the syntactic parameters, determine the group of each of the sentence types defined by the following hierarchic numbers of their terminal tagmemes:

(a) 111,
(b) 1, 21,
(c) 11, 121, 13,
(d) 11, 121, 1221, 1222,
(e) 1111, 1211, 2111, 2211,
(f) 111, 112, 121, 122, 123, 2,
(g) 1, 2, 311, 312, 41, 42, 5.

(13) Define the following sentences by the hierarchic numbers of their terminal tagmemes:

(a) *tina pradhāna āvāta aragha sāī salakhkha diya* (Cand),
(b) *ina ākhiyani āgāī tāī mohana ekau pala jani hohu niyāre* (Sūr),
(c) *taba ammā kō rovati dekhi śrīṭhākurajī kahate ammā mati rove* (Gokulnāth),
(d) *us tīrthrāj prayāg kā bantā ilāhābād hai* (Gupt),
(e) *ājkal purtgāliyō kā muqābilā karne ke liye jahājō kī taiyārī mẽ lagā hai sultān mahmūd* (Varmā),
(f) *abhī inṭrāvīnis injaikšan dekar dubārā eksre kar rahe hāī* (Prabhākar),
(g) *rājy kṛṣi aur pašupālan ko ādhunik aur vaijñānik praṇāliyō se sāghaṭit karne kā prayās karegā* (Sāvidhān).

(14) Give at least one actual example of each of the sentence types defined by the following hierarchic numbers of their terminal tagmemes:

(a) 11, 211,
(b) 1, 21, 22,
(c) 1, 21, 31, 32,
(d) 11, 12, 211, 212,
(e) 1, 21, 31, 32, 33,
(f) 11, 121, 122, 2111, 2112, 2121, 22,
(g) 1, 2, 31, 32111, 32112, 32121, 32122, 411, 42.

(15) Describe in detail the periodic system of syntactic units of each of the following passages:

(a) *šukdevjī bole ki jab hari ne giri kar se utār dharā tis samay sab bare 2 gop to is adbhut caritr ko dekh yõ kah rahe the ki jiskī šakti ne is mahāpralay se āj brajmāḍal bacāyā tise ham nand sut kaise kahāīge. hã̃ kisī samay nand yašodā ne mahātāp kiyā thā isī se bhagvān ne āy inke ghar janm liyā hai. aur gvālbāl āy 2 kr̥ṣṇ ke gale mil 2 pūchne lage ki bhaiyā tūne is komal kamal se hāth par kaise aise bhārī parvat kā bojh sambhālā. aur nand yašodā karuṇā kar putr ko hr̥day lagāy hāth dāb āgulī caṭkāy kahne lage ki sāt din giri kar rakkhā hāth dukhtā hogā. aur gopī yašodā ke pās pichlī sab kr̥ṣṇ kī līlā āy kahne lagī̃:*

*cau° yaha jo bālaka putra tihāro / cirājīva braja ko rakhavāro //*
*dānava daitya asura sāhāre / kahã̃ 2 braja janana ubāre //*
*jaisī kahī garga r̥ṣirāī / soi 2 bāta hoti hai āī //* (Lāl)

(b) *abhī sūryāst nahī̃ huā thā. mānmandir ke pathrõ kā rāg sādhyākālīn prakāš se hor sā lagā rahā thā. kadlī pallvõ kā ākār-prakār aur sahī rāg mohak thā. jaise jaise nikaṭ pahũctā gayā uske camatkārpūrṇ vipul vaibhav aur sauṣṭhav ke ras mẽ mast hotā gayā. dvār par pahũckar apnī kalpnā aur šilp ke kaušal par usko abhimān huā. usī samay mr̥gnaynī ke citršālā ke us adhūre citr kī bāt yād āī. kalā kā anušīlan aur katravy kā pālan sāth sāth cal sakte hãī. mãī senā ko bhī sajãũgā aur lalit kalāõ kī bhī unnati kartā rahũgā. nāyak baijū ne āj horī ko kitne miṭhās ke sāth gāyā thā. kitnā mahān kalākār hai vah. mr̥gnaynī kā tāṇḍav nr̥ty bhī kitnā sundar kaisā salonā thā. mr̥gnaynī ke adhūre citr kī donõ dašāõ mẽ eksāth hī rāg bhare jā sakte hãī usne socā.* (Varmā)

(c) */1/ sãgh kī rājbhāṣā hindī aur lipi devnāgrī hogī. sãgh ke rājkīy prayojnõ ke liye prayog hone vāle ãkõ kā rūp bhārtīy ãkõ kā antarrāṣṭrīy rūp hogā. /2/ khāḍ /1/ mẽ kisī bāt ke hote hue bhī is sãvidhān ke prārambh se pandrah varṣ kī kālāvdhi ke liye sãgh ke un sab rājkīy prayojnõ ke liye āgrejī bhāṣā prayog kī jātī rahegī jinke liye aise prārambh ke ṭhīk pahile vah prayog kī jātī thī. parantu rāṣṭrpati ukt kālāvdhi mẽ ādeš dvārā sãgh ke rājkīy prayojnõ mẽ se kisī ke liye āgrejī bhāṣā ke sāth sāth hindī bhāṣā kā tathā bhārtīy ãkõ ke antarrāṣṭrīy rūp ke sāth sāth devnāgrī rūp kā prayog prādhikr̥t kar sakegā. /3/ is anucched mẽ kisī bāt ke hote hue bhī sãsad ukt pandrah sāl kī kālāvdhi ke paščāt vidhi dvārā /k/ āgrejī bhāṣā kā athvā /kh/ ãko ke devnāgrī rūp kā aise prayojnõ ke liye prayog upbandhit kar sakegī jaise ki aisī vidhi mẽ ullikhit ho.* (Sāvidhān)

(16) Carry out at least one *n*-step downward or upward generation of each of the following tagmeme types:

(a) *P 1.21*,
(b) *P 322*,
(c) *S 1*,
(d) *S 321*,
(e) *O 422*,
(f) *O 81*,
(g) *M 612.611*,
(h) *M 72/51*,
(i) *M 91*.

(17) Carry out at least one transformation of each of the following syntagma types:

(a) *P 21* : *S 82*,
(b) *P 412.31* : *O 1*,
(c) *P 51.321.21* : *M 51*,
(d) *S 422* : *O 411*,
(e) *O 531* : *M 82*,
(f) *M 622* : *M 51*,
(g) *M 533* : (*'S 1*) : *M 82*,
(h) *M 1* : (*'M 1*) : *M 51*,
(i) *M 71* : (*'P 22* : *O 1*) : *M 421*.

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